Is Meat Good or Bad?

Learn What Modern Science Has to Say About Animal Products

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Always consult with your doctor before changing your diet.

Preface

I hesitated for a bit to give this special acknowledgement at the front of the book as if you're familiar with his work, it reveals the answer to the title of the book (but so will reading the table of contents). I wanted the answer to be a gradual one emerging from solid scientific evidence and critical thinking. But I know it is the right thing to do.

This book stands on the shoulders of another man's work. When I wrote the original book I wanted it to be the shortest and most concise reading material possible that still answered the question once and for all. While I did my own research, I needed the best evidence out there to convince people, so I had to use this person's material. The vast majority of the studies as well as many arguments used in the original book (the first half of the current book) and a good number of the studies (and I probably used some of his arguments there as well) from the new chapter (the last half of the book) comes from Dr. Michael Greger's lifework so far. I say "so far" as he's still working hard researching and creating new material. He also has a team of volunteers who I'm certain deserve praise for their hard work as well. So thank you Dr. Greger and team for everything you do in the name of health science and for the good of the public.

Dr. Greger, if you're reading this, while I know people often use your research without giving you proper credit, I think everyone in the community knows who the real hero is.

This book was written independently and without the knowledge of anyone mentioned within. As such, any errors found in this book are mine and mine alone.

Finally, this last version of the book should always be free. It's copyrighted, but you may make as many copies as you want to give to others.

Enjoy!

Dying Without Warning

I couldn't believe the news. The father of one of my friends died. And he was only in his early 50s.

The guy wasn't a health nut, but he never had any serious health issues and he definitely made time for the gym. And at that gym, he played a game of basketball with his son. After, he said he overdid it and had to sit down only to die of a massive heart attack moments later in the arms of his son.

When they opened him up, his arteries were clogged with plaque.

It is a pretty scary concept, to have a heart attack that kills you without warning.

And with coronary heart disease (narrowing of the arteries to the heart from plaque) being the number one killer for men and women in America and the world, it is way more common than you think.

Not an issue for me, I exercise regularly and eat healthy.

Exercise may not be enough. We are seeing presumably fit people dying. And the "healthy" diet you are consuming may be the reason you will have a heart attack one day.

You could be jogging one moment, only to be dead the next.

But there is an explanation for everything. And using science, we can explain and prevent heart disease. So let's crack open this book and find out how not to be a victim of a heart attack.

Extra, Extra, Read All About It: Are You a Victim of Headline Science?

Headline science, the most popular science of all time.

Why read an article when you can just read the headline?

Like this one from *The New York Times*:

"Eating Vegetables Doesn't Stop Cancer"

Thanks headline science! I'll make sure all my friends know this amazing fact.

And this one:

"Fruits and Vegetables Do More to Reduce Cancer and Extend Life than Many Prescription Drugs"

Wait... I thought vegetables do nothing against cancer (trust me, they do). How do you know which one is telling the truth?

I guess you'll have to read the articles, the studies they cite, do a bit of research yourself, and do some critical thinking of your own.

(Turns out that the study *The New York Times* cited did find an inverse relationship between fruit and vegetable consumption and cancer (i.e., vegetables prevent cancer), but it was smaller than expected. So to say eating your vegetables will not help stop cancer is twisting the truth. But, hey, anything to sell papers.)

Let's talk at a high level how scientists do their research to better understand things.

It doesn't always follow this format, but this is how it usually works.

First, there are the *observational* studies.

You are viewing the world around you and trying to find correlations. So something like a survey would be an observational study. And maybe an observation in a survey finds vegetable consumption coincides with better athletic performance in a population.

Once they find correlations, they then see if there is causation.

This is where *experimental* studies come in.

They create controlled experiments to recreate and explain the link. Health scientists can do this by conducting a trial with people (e.g., have a group of people increase vegetable consumption and a control group that doesn't). After that, they'll try to recreate the chemical reactions happening in the body in a laboratory to completely understand what is going on.

But those molecular studies explain *why* something happens in our bodies. The experimental studies, however, show that it *does* happen, which makes them the most important. While the observational studies show that something *might* be happening inside our bodies, which is why observational studies are never enough.

(Technically, molecular studies can be experimental or observational in nature, but let's not get too bogged down with the details here.)

Of course, one experimental study isn't ever enough. So you want several and you want to vary them so you can narrow down what is happening.

You can get more specific by using only certain vegetables, having participants do only certain exercises to test athletic performance, etc. You get more narrow until you can explain your observations.

And when we do that we find out great things about our health like beet consumption being an amazing booster to athletic performance.[1],[2]

But when you only start and end with an observational study, that is just bad science. But the unethical media loves bad science to stir up controversy and attract readers.

And if people only read the headline, they'll never know if it is bad science or not.

Like this one:

"Vegetarians Less Healthy, Lower Quality Of Life Than Meat-Eaters"

But if you look at the study (a telephone survey in Australia), the author said there was no known causation between being a vegetarian and a lower-quality or less healthy life. There is a correlation, but, as the author notes, that correlation could be explained by the fact unhealthy and depressed people turned to a vegan or vegetarian lifestyle hoping to feel better. But they weren't for sure. Why? Because this was an *observational* study. We need to follow up with experimental studies.

But putting the truth in a headline that doesn't shock people won't get readers.

Could you imagine:

"Small Phone Survey Showed Some Vegetarians Do Have a Lower Quality of Life and Health (Might be Due to Unhealthy and Depressed People Trying the Lifestyle for the First Time to Help Themselves). Follow Up Studies Needed."

No magazine would run that.

Fine, but don't let yourself fall victim to headline science. Read and be critical.

The same goes with this book. Read it all, check the studies I cite, compare what I say with contradictory evidence and other written material, and then make up your mind.

I hope you enjoy the book!

Does Red Meat Kill You?

Ah, the most evil of all animal products—especially when processed. Or is it?

Well, if you believe what the government and what a lot of research institutions say, then red meat is clearly bad for you. However, people advocating a diet based on meat and animal products argue that the government and those institutions have no idea what they are talking about.

When answering health questions, it is best to look very broadly at the evidence and then narrow our focus to explain the observations. But in both situations, you always want to look at the science.

So let's take a 10,000-foot view with a 100,000+ participant study.

The Big Picture

In 2012, a group of Harvard researchers published a study showing red meat consumption shortened your life. A group of 121,342 participants were followed for about 30 years. It concluded that not only did it shorten your life but it also caused other health problems (like cardiovascular disease and colorectal cancer).[3] Harvard has even said that "healthy meat consumption" is clearly an oxymoron.

So how much red meat was needed to impact mortality? About 3 ounces a day, roughly the size of a deck of cards. Keep in mind, that was *unprocessed* red meat. Of course, processed red meat was even worse.

But that's just one study!

True. But instead of telling you, again, it was over 100,000 people, over 30 years of data, and it was done by Harvard (I doubt they would drop the ball on this one), I'll refer to a bigger study.

How about the EPIC study with over 500,000 participants (448,568 by the end of the study).[4]

What did they find?

Red meat consumption is linked to a higher mortality rate.

Wait, the conclusion said only processed meat had a link!

Okay, let's back up here. I'll give you the exact quote.

"After multivariate adjustment, a high consumption of red meat was related to higher all-cause mortality, and the association was stronger for processed meat."

Multivariate adjustment means they controlled for factors that might throw off the conclusion (like their age, whether they smoked or not, family history of death, etc.). So we have the same results as the Harvard study.

Red meat consumption is clearly linked even when you adjust for other factors.

Why does the conclusion not say that?

They also did what they called a "measurement error correction."

But here is the thing, they didn't correct for any known errors. They randomly sampled a small percentage of the survey and asked them to do a 24-hour recall of food they ate. In other words, they asked them to remember what they ate the previous day. And 24-hour recalls have been proven to not be very accurate at times. They should have monitored their food consumption instead.

In theory, the results from the smaller sample size group should be more accurate than the survey, but even then it doesn't fairly represent the errors made by the 500,000 as a whole. The errors made by the 500,000 might have been, overall, the exact opposite (e.g., the smaller sample group reported more meat consumption on the survey than

they actually ate, while the 500,000, as a whole, reported less meat consumption than they actually ate.)

That does seem a little odd. But they're the scientist, I'm sure they know what they're doing here.

Keep in mind, in this massive study there were about 40 organizations that contributed financially and about 50 authors. While the study claimed no competing interest, it is pretty common to have these organization and authors be paid by different industries (maybe not for this one study but other studies authors have done in the past, other studies they hope to be funded in the future, and for donations that some of these organizations would want to receive in the future), which include ones like the dairy, the pork, and the beef industry, while not mentioning it. So there is often pressure to soften the blow on findings that look bad for their financial contributors or for potential financial contributors.

But the main problem here is this is an observational study. You want to find correlations to follow up on with experimental studies. You do not want to get rid of them. And, clearly, there is a correlation between red meat and mortality.

I don't know. Sounds like you are trying to find correlations that might not be there.

Okay, how about another study with another 500,000 people? The NIH-AARP study.

What did they find? The same thing. Both red meat and processed meat increased total mortality, cancer mortality, and cardiovascular disease mortality.[5]

Now we have three separate studies with sample sizes ranging from 100,000 to 500,000 people showing a link between red meat and increased mortality and disease.

Yeah, but isn't that because they are eating grain-fed, hormone injected meat? Grass-fed, red meat from wild animals might not have those problems.

The experimental studies, the only studies we really care about, show no difference between those types of red meat. I'll get into it later, but we have studies showing how even these "clean" sources of meat create essentially the same health problems.

For now, let's get into the specifics why red meat is bad for you.

Wait! I have a study with over 1,000,000 people showing no unhealthy link to red meat! Just processed![6]

Like I said those big studies are there to just help us decide what to investigate. We shouldn't take them as fact or by themselves as good science.

But, okay, let's look at that study. It was a review study. In other words, they looked at different studies and drew their conclusions from there.

Out of 1,500 studies to review, they picked 20. Keep in mind, 17 of the 20 studies reviewed were observational studies. Because of the number of factors we don't know about or cannot control in observational studies, we expect them to not always agree with each other.

And they only looked at stroke, coronary heart disease, and diabetes, not cancer or mortality rates. I never made an argument about diabetes so let's put that to the side. We'll look at your study in regard to showing no link with red meat to stroke or coronary heart disease.

Let's make sure we are on the same page here. Arterial plaque is the only cause of coronary heart disease (our number one killer in the world) and virtually the only cause of heart attacks. Arterial plaque is also the primary, but not only, cause of stroke (our second most common killer). Let's look at stroke first.

Of those 20 studies, only 3 looked at the association between stroke and red meat consumption. That would make the sample size much smaller than 1,000,000 people. And all 3 were observational studies.

Let's take a closer look at those three studies.

The first one was done in Japan looking at people who were exposed to atomic bomb radiation. Not exactly the best sample population. And the institute that did the study is focused on caring for radiation exposure victims, not dietary health. Finally, animal consumption was *not* associated with preventing strokes caused by blocked arteries (which accounts for about 85% of strokes). It only *appears* protective against Hemorrhagic Stroke (which occurs when a weakened blood vessel ruptures and accounts for about 13% of strokes).

The second study was *against* red meat consumption, "These data suggest that a dietary pattern typified by higher intakes of red and processed meats, refined grains, and sweets and desserts may increase stroke risk, whereas a diet higher in fruits and vegetables, fish, and whole grains may protect against stroke."

The third study looked at middle-aged men in the United States. The problem with this study has to do with the fact that once you are in that age range a lot of damage to your body has already been done (things like calcification of atherosclerosis plaque happens more in older people and takes longer to treat). In other words, if they started to increase or decrease red meat consumption, it may not make much of a difference right away (at least not during the length of the study). This is the "sick population" argument (an important concept to understand in health science), which I'll talk more about later.[7]

So what about the Japanese study you mentioned that showed animal products were protective against Hemorrhagic Stroke - the cause of 13% of strokes?

So is red meat and/or saturated fat protective against strokes? Overall, most likely not (I'll talk more about this in detail). However, I think it is the B12 in red meat that is showing the protective or neutral effect with

this one type of stroke. B12 protects arteries from homocysteine toxins, which could explain the inverse relationship found.[8]

But that you can supplement for cheap. (B12 is one of the cheapest supplements you can buy.)

(For those of you who don't know, B12 is made by bacteria. And those bacteria are mostly found in your colon. But your colon can't absorb the B12 already in it so it has to find a way from your anus to your mouth—gross. Certain animals are ruminants, like cows, that can absorb the B12 they produced due to their unique digestive tract. But all other farm animals, like pigs, have B12 because they live in such filthy environments—their feces eventually get in their mouths—or because of supplementation. If you're wondering how we used to get B12 without farm animals or how the rest of the world gets it, one reason is that they eat bugs, which are full of B12. Even the Bible talks about what bugs people ate back in the day. And since everything was filthier back then with feces and dirt (the bacteria that makes the B12 in your gut came from the dirt), everything they ate, especially from nature, probably had a ton of B12 in it. But eating from nature can also get you sick with other bacteria, so it's probably best to just supplement.)

But why get B12 from an unhealthy source? Would you drink a healthy green smoothie that is laced with poison? Eating red meat for B12 doesn't make any sense. And even omnivores (meat and plant eaters) have been shown to be deficient. So supplementation is best for everyone.

But what about the findings on coronary heart disease?

The analysis of coronary heart disease included 4 studies when it came to red meat. So in regard to coronary heart disease, the study size is also much smaller. 3 of them were observational and 1 was experimental. The experimental study (again, the only studies we really care about) *did* find that red meat causes coronary heart disease.

For the three observational studies, I think the "sick population" argument, which, again, I'll talk about later in the specifics section, easily explains the inconsistencies between observational studies. And

before you say we don't have a sick population, keep in mind coronary heart disease is the leading cause of death not just in the United States but in the world.

Furthermore, with observational studies, it's easy to present the data or create surveys that are confusing for both the readers and the people participating in the studies. And when you consider that many authors are paid by certain industries hoping for certain findings, you can see the problem with observational studies.

Finally, the study you found was done by a Harvard professor some time ago. Yet, Harvard's stance is still to avoid red meat. If that study had more merit, don't you think Harvard would have changed their position?

Remember, you expect to see inconsistencies between observational studies. There are just too many variables to control for. But you don't end your discussion using observational studies. You go on to the experimental studies. And that is what we are about to do.

So when you look at all the observational studies as a whole, clearly there is a link between red meat consumption, disease, and mortality. Now let's see what is causing that link.

Specifics

Cancer

Let's start with cancer.

Does red meat cause cancer?

Looking at the Harvard study again, red meat has been linked to colorectal cancer, but how?

According to the American Institute for Cancer Research, heme iron (what makes red meat red) damages the lining of the colon.

But my trainer says that is the best kind of iron!

First, you have to understand that iron is both good and bad for us. We need it to make red blood cells to carry oxygen, but it also causes oxidative stress. And oxidative stress damages your body.

This heme iron is a type of iron your body can't regulate. Since it is already wrapped in hemoglobin, it can easily pass through your colon and then into your blood. Trainers and meat advocates call it high absorbing, but not really. Your body simply can't keep it out of your system. Forced absorbing would be a better term. Even if you are at toxic levels, your body has no way to keep heme iron out of your system.

Plant-based iron (non-heme iron) *is* regulated by your body. If your body needs more, it absorbs more. If your body doesn't need as much, it absorbs less.

While non-heme iron has several systems to regulate it, heme iron appears to hijack the protein system used by your body to move your own hemoglobin and oxygen around and force itself into your colon cells and blood. While heme absorption is dependent on the presence of these hemoglobin related proteins and the levels of these proteins probably have something to do with your need for oxygen/hemoglobin, you could argue that there is *some* regulation (though I use that word very loosely here) of heme iron absorption. But it’s nothing compared to the regulation of iron found in plants.[9][10]

But keep in mind, we *need* tight regulation of our iron levels. Why? Because our bodies have no good way to get rid of the excess. While woman can get rid of some through their periods, neither gender really evolved anything to get rid of excess iron in our bodies. Given iron’s pro-oxidant effect, this might explain why donating blood as little as twice a year is linked to a decrease in cancer and mortality rates.[11]

Given that information, I would advise you to donate blood when you can. Not only could you save someone’s life but you might just save your own.

So the heme iron found in red meat and the oxidative damage it does to your cells might explain this link to cancer.

Look! I found a study showing red meat does not cause colon cancer![12]

First, they never said red meat doesn't cause colon cancer. They said, in their opinion, that there were so many factors you cannot definitely pin it on red meat. I disagree with their opinion, but I'll return to that later. For now, let's look at who did the study.

One of the authors, Alexander, works at a for-profit corporation (Exponent, Inc.) traded on NASDAQ. They are a consulting firm for different industries. You typically see them refuting evidence made by the media when it makes a company look bad (e.g., Dateline's report on the explosiveness of Chevrolet's fuel tanks and Consumer Report's findings on Suzuki's roll-over safety).

I'm not saying the author had an alternative motive, but it certainly does raise a red flag. (In my personal experience working at a firm that consulted for different companies, we were as aggressive as possible to please our clients.)

Furthermore, this summary review only looked at observational studies, not experimental studies (are you starting to see a trend here with these pro-meat studies?). The problem with observational studies agrees with their conclusion: you can only show *potential* factors as there are too many factors present in any group you study to give a definite answer.

(Please note, people who do these studies understand this and try to account for it by researching alternative explanations and by using mathematical models to control for disruptive influences. But still, you can only get to *potential* factors.)

But let's do a better job than summarizing some observational studies. Let's look at some meta-analysis studies (review studies that look at *all* the studies done on a topic). Not just one meta-analysis, but three, all done by different authors and independent of each other. What did

they find? All of them showed eating red meat caused a 20-30% increased chance of getting colon cancer.[13] Keep in mind, they only used studies they considered high quality (i.e., ones that best controlled for other potential factors). So, without a doubt, red meat consumption is a potential factor in causing colon cancer.

(If you want to know more about meta-analysis studies, they find all the studies on a given topic and apply statistics to determine which ones to look at closer and which ones to give more weight to when calculating everything.)

Now, let's look at the experimental data. The experimental and molecular studies clearly show that red meat causes colon cancer.[14] It all goes back to the heme iron. The heme iron creates free radicals (hydroxyl radicals, which are extremely strong) that are genotoxic (causes DNA damage) to your colon. The heme iron also creates fat peroxidation, which produces chemicals that aren't just genotoxic, but also appear to promote the growth of tumors in the colon. It is even worse with cured (processed) meat as the heme iron also creates N-nitroso compounds (also genotoxic).

There you have it. The experimental studies perfectly explain our observational findings: red meat causes colon cancer and processed red meat is even worse.

Both the observational data and the experimental data support the fact that red meat is clearly a significant cause of colorectal cancer.

And it doesn't matter if it is grass-fed, that "superior" meat still has heme iron in it.

Now there are also other ingredients in meat that, in general, seem to have a pro-cancer effect (e.g., Neu5Gc, PhIP, polycyclic, aromatic hydrocarbons, L-carnitine, leucine, advanced glycation end products, and arachidonic acid) by either feeding cancer cells, causing DNA damage, causing inflammation, and/or accelerating the aging process.

I'll talk more about some of these later on, but keep in mind red meat either has these ingredients or creates them during the cooking process (and, again, it doesn't matter if it is grass-fed or not).

Between heme iron and all these other ingredients, it is no wonder that we have a clear link between red meat consumption and cancer.

Cardiovascular Disease

On to the next subject and back to getting strokes and coronary heart disease.

The problem probably has to do with all the saturated fat in red meat (which is also found in just about all animal products) producing atherosclerosis plaque in our arteries.

But people keep telling me saturated fat is good for you!

Let's talk about the heart surgeon Doctor Esselstyn to answer that. On a mission to stop coronary heart disease, he started advising patients on what to eat. And by using MRI scans on them, he showed that a diet that is free of animal products (saturated fat) and low-fat in general would open up the arteries. The MRI scans show the arteries going from being barely open to completely dilated.

I don't know what else is more convincing than that. You can literally see the arteries opening up once you remove saturated fat from the diet (FYI, with the exception of coconuts, a few nuts, and the microscopic amounts in other plant foods, saturated fats only come from animal sources).

What about the Masai? They eat almost nothing but animal products and they show no sign of heart disease.

But the Masai tribe of Africa burns calories like elite athletes. They don't have jobs where they sit around all day. They never stop moving.

(Saturated fat is an energy source. And that molecule is broken down, specifically to water and carbon dioxide, when it is converted to energy.

And that’s why exercise will work to get rid of body fat. Unfortunately, it takes a lot of exercising to get rid of a decent amount of fat. You’re better off just restricting the calories you eat. And saturated fat, which pretty much only comes from animal products, is the most calorically dense macronutrient out there.)

And, still, a study done of their bodies (autopsy examinations) clearly showed that their arteries are caked with atherosclerosis plaque (equivalent to that of an old man raised on a Western diet).[15] Keep in mind, their meats are not processed and their animals are fed off the natural vegetation found in the area. So grain-fed meat isn't the problem here. Their constant activity is what probably keeps coronary heart disease at bay (barely). Working out all day long isn't an option for most people.

And other studies show even if you work out like a marathon runner, a person eating a diet free of animal products (vegan), without the crazy exercise, will still have less atherosclerosis plaque.[16]

Besides the Masai, if you look at different preagricultural, hunter-gatherer tribes and ancient civilizations, they also suffered from atherosclerosis.[17]

I'll take it one step further. Compare the Masai people in Africa to the Bantu people in Africa who eat mostly a vegan diet. Their autopsy reports showed only one *potential* case of coronary heart disease in 1,328 bodies examined.[18] That means the Bantu have clean, healthy arteries.

And it isn't limited to the Bantu. For all cultures who rely solely on or almost solely on plant foods to obtain their nutrition, heart disease becomes virtually nonexistent (like the poor class in India[19] and China[20] before the Western diet was introduced). But once the food changes to a meat-based diet, heart disease starts to show up.

We see that plaque, by looking at autopsies, comes in once their diet changes. And the *only* thing that causes coronary heart disease is the buildup of atherosclerosis plaque. And, remember, coronary heart disease is the number one killer in the world.[21]

I think why you see such a clear difference between the Masai and Bantu, and not in all observational studies, has to do with the "sick population" argument. Basically, if you have a population already eating a lot of red meat and possessing thick layers of plaque in their arteries from decades of bad diet, you may not see much of a difference when you add some more or reduce meat consumption for a few months as these people are already "sick" with arterial plaque. And arterial plaque doesn't disappear overnight. Dr. Esselstyn's MRI scans of arteries opening up were over a period of 3 to 5 years (though the benefits and reduction of plaque certainly happen sooner than that, there's probably still enough plaque there to rupture, cause a blood clot, and thus a heart attack) and that was with a very low-fat, vegan diet. Plus, some studies might have people reduce animal products and saturated fat, but then they end up eating more processed foods and trans fat (hydrogenated plant oils that are as bad or worse than saturated fat when it comes to heart disease). Processed foods aren't as much of a factor when comparing the Masai to the Bantu.

There has been a number of systematic reviews (reviews of only high-quality studies) and meta-analysis studies done between 1994 and 2014 (20 years) looking at saturated fat and the findings of the studies were, overall, that reducing or replacing saturated fats with plant-based fats (that *aren't* hydrogenated and especially when in their whole food form like nuts) leads to a decrease in cardiovascular disease.

But people are quick to point out just one of those studies from 2014 in the Annals of Internal Medicine showing no link. And the media makes sure to create those sensational headlines with it (more headline science).

The problem with the 2014 study has to do with how each person is different. Every person has a natural cholesterol set point. Yours might naturally be at 170 while another person's is naturally at 130. While we know through the experimental studies that eating less saturated fat means lower cholesterol levels and more saturated fat means higher cholesterol levels, comparing one person's cholesterol levels to another person's levels, especially in an observational study, would make it much harder to draw that conclusion. But that's what a cross-

sectional study does. And guess what kind of studies were used in the 2014 meta-analysis study? Cross-sectional. Not only that, but the 2014 study was essentially a rehash of a 2010 meta-analysis study done by a man who is funded by the dairy and beef industry. It seems like the study was designed to be bad science from the beginning to confuse the public.

Furthermore, the 2014 Annals of Internal Medicine study has been criticized for having errors, omissions of key studies, and failing to mention how they picked their studies for review. No wonder Harvard came out and said that the study was "seriously misleading and should be disregarded."

The experimental studies (not just the *good* observational studies), specifically controlled trials where they lock people up and control what they eat, support the fact that saturated fat increases plaque in your arteries.[22] In general, lipids (e.g., fats) are carried to arteries by the protein LDL and the protein HDL removes the lipids from the arteries. And it has been shown that overall with experimental studies, saturated fats increase the amount of LDL in your blood while monounsaturated and polyunsaturated fats increase HDL.

When you look at the weight of the evidence (Dr. Esselstyn's work and MRI scans, the Masai and Bantu people, ancient hunter-gatherer civilizations, compare marathon runners to sedentary vegans, and the best meta-analysis studies done) there is no doubt animal products contribute a great deal of plaque to your artery walls.

Most likely it is the saturated fat. But even if it is somehow not the saturated fat, a diet based on animal products (including red meat) clearly adds plaque to your arteries. Period.

But it gets even worse with red meat.

There is a chemical called Neu5Gc that primates (like us) lost the ability to make. This is most likely a good thing as it is believed to cause chronic inflammation due to an antibody reaction which might feed tumors and cause atherosclerosis.[23],[24]

The science on Neu5Gc is in its infancy, but the link seems very strong.

Furthermore, our diet containing Neu5Gc from eating other mammals (e.g., red meat) might explain why humans get rheumatoid arthritis, while our primate cousins do not. And it would also explain why arthritis sufferers feel better when meat is removed from the diet.

But, hey, if you want to be like the several meat-based diet advocates who have died of a heart attack (I won't name names out of respect for their families), then go ahead and eat meat. These diet gurus are dying in their 50s!

And exercise is generally not enough to prevent heart attack (unless you are working out like the Masai). The man who was accredited with starting America's fitness and jogging revolution died at age 52 of a heart attack. He thought diet wasn't nearly as important as exercising consistently. When they opened him up, he had 70-95% blockage of major coronary arteries. Exactly what Dr. Esselstyn would see time and time again during his open heart surgeries.

Now compare those heart attack victims to Doctor Ancel Keys. He was the original advocate of replacing animal fats with plant fats and having a low-fat diet (the guy many Paleo/Primal advocates say screwed up the public with "bad health information"). Do you know how old he was when he died? He was over 100. And what about his wife who co-authored his books and also did his diet? 97.

Who do you want to be?

Inflammation

I know people tend to think that meat, especially red meat, is needed to build strength, to be muscular, and to have high testosterone levels. It's not. In fact, many male vegans (people who don't eat animal products) report higher testosterone levels than men who eat meat (it's probably due to vegan bodies working at their optimum since saturated fat isn't clogging everything). Another misconception is that inflammation is

good for building our bodies. But, in general, inflammation should be avoided as in the long-term it will damage and age us.

And animal products have always been associated with inflammation, but the science explaining it is pretty new.

The big cause of inflammation seems to be dead bacteria in animal products (including unspoiled products) when you eat them. Doesn't matter if you cook it to a crisp or expose it to acid (like your stomach), the dead bacteria are still there. And they get absorbed with the fat in your food into your blood. Then your immune system detects the dead bacteria, reacts to it as if it was alive, and starts the inflammation process throughout your body. And that process can last for hours.[25]

What about bacteria found on plant food?

Well, typically, those are the bacteria naturally found in our guts (that's where they came from). So they are usually good bacteria (and microbes can rarely attack both plants and animals), thus our immune system shouldn't see them as a threat.

What about E. coli?

E. coli comes from fecal matter. Any plants containing *E. coli* were probably cross-contaminated with animal waste.

So think about it, when you include meat in every meal your body is in a constant state of inflammation throughout the day. When you consider that continuous inflammation is linked to organ failure, joint damage, and maybe all forms of chronic disease, that isn't a good thing.[26]

…but my meat is grass-fed.

Again, this does not matter. Grass-fed or not, it still has the same dead bacteria and thus still causes inflammation in our bodies. There is even a study that shows wild, grass-fed animal meat causes inflammation in our bodies once we consume it.[27]

And don't forget about Neu5Gc. Since Neu5Gc has only been found in mammals, up to this point, red meat should cause even more inflammation than other animal products.

The bottom line is all meat equals inflammation.

Chicken: Finger Licking Good (Plus Cancer)

Certainly, low-fat, white meat is a safe alternative.

Nope, I would even say it is worse.

Let's see why chicken is so bad.

Not a Safe Alternative to Red Meat

As you probably already know, over-cooking meat (especially at high temperatures) can create body-damaging, cancer-causing chemicals to form. One of these is called advanced glycation end products (AGEs) known for its highly oxidative damage to cells and is believed to contribute to the aging process. After testing 500+ foods, do you know which one came out with the most AGEs per serving? BBQ Chicken.[28]

But it isn't just AGEs that are formed with chicken.

Heterocyclic amines (HCAs) are carcinogens that are usually formed only when meat is cooked at a high temperature (like pan frying or barbecuing). However, chicken has been shown to create these HCAs including PhIP (a very dangerous HCA when it comes to breast cancer) at even low temperatures.[29]

Keep in mind, these chemicals created from cooking have been linked to kidney cancer, colon cancer, lung cancer, and pancreatic cancer (a cancer that is rapidly fatal in most cases).

And virtually all animal products can form these chemicals when cooked. Just more reason to stay away from animal products altogether.

(When you pick your poison, HCAs are found in higher amounts in meats that are cooked at higher temperatures or cooked well done.

However, the less you cook your meat the more you risk *E. coli* and parasitic infection. Again, your best option is to just stay away from it all together.)

And speaking of pancreatic cancer, the NIH-AARP study showed a link between animal fat and pancreatic cancer, but no association with plant fats.

Furthermore, two other studies showed an association between pancreatic cancer and animal protein and animal sugar (lactose, which is only found in milk). Just another reason to stay away from all animal products.[30],[31]

But I digress. Back to chicken!

It has been found out that many cancers are methionine dependent (methionine is an amino acid). In other words, without that amino acid they would die. If you want to restrict methionine in your diet, stay away from animal products. They contain far more methionine than plant foods. However, chicken, turkey, egg whites, and fish vastly beat out all other animal products for methionine levels.[32]

And in a random sample of chicken at grocery stores, one study showed over half of the purchased chicken meat contained unnaturally high levels of inorganic, cancer-causing arsenic (probably due to the arsenic-based feed additives and drugs used on the chickens).[33]

Chicken has way too many harmful chemicals in it.

Chicken = Penis Cancer?

So here is another interesting thing about chicken, it has quite a bit of viruses that are harmful to humans.

These viruses seem to promote cancer in the human body. And this might explain why chicken is linked to blood cancer (lymphoma).[34]

And high cancer rates (including penis cancer) were found with those who worked with chicken.[35] My guess is they handled one kind of chicken all day to then handle another kind later that night.

Keep in mind, they take measures to protect themselves, as required by law and company policy, like sanitizing their tools, equipment, and workline; washing their hands before and after work and their breaks; and wearing industrial rubber gloves that can run up to their elbows over or taped to their disposable jackets. And how much safety do you exercise when you handle raw meat at home?

Chicken isn't just linked to penis cancer, but also to the development of a smaller penis.

Phthalates, especially MEHP, are linked to reduced penis size if it was in the blood of the mother while pregnant.[36] What animal food has the highest level of MEHP? Poultry and eggs.[37]

Besides cancer, poultry workers suffer more from thyroid conditions, schizophrenia, autoimmune neurological disorders, peritonitis, and disease of the kidneys.[38] Again, this is probably due to the microbes that can harm both humans and chickens.

Speaking of microbes, another study showed that about half of all chickens purchased at a grocery store contained *staph* (*Staphylococcus*) bacteria. Turkey was even worst.[39] And *staph* contaminated foods are one of the leading causes of food poisoning resulting in vomiting and diarrhea.

Do you really want to put that stuff in your mouth?

Fish is a Sponge of Toxic Waste

But fish is still good for you, right?

There are probably more chemicals in sea life than any other animal product.

Mercury is still an issue with fish.

And mercury usually takes about one year for the current levels in your body to drop to about 1%. That is the good news. The bad news is other toxic chemicals in fish (dioxins, PCB, and DDE) can take up to 60 years for your body to lower its levels to 1% (based off a 10-year half-life).[40]

(A little more information about the chemicals I just mentioned. They are man-made chemicals created by or used in the manufacturing process or are pesticides we developed. While banned, nature has a hard time breaking them down and, thus, the reason they are still a problem today. They were often leaked into different bodies of water which caused fish and anything that eats fish to contain these chemicals.)

Fish also seem to be the primary source of the obesogen, organotin (endocrine disrupting compounds made of tin and hydrocarbons created for various man-made products), in our diet.[41] Obesogens signal cell receptors to create fat cells.[42]

But these chemicals in fish are nothing to laugh at. They are of real concern to us. For example, not just mercury, but also PCB has been shown to hurt brain development of the fetus.[43]

And mercury's neurological poisoning has been shown to outweigh DHA's benefits to brain development when consumed (DHA, or docosahexaenoic acid, is an omega-3 fatty acid).[44]

I found this study that says the benefits far outweigh the risks from contaminants.[45]

Actually, our studies came to the same conclusion, that DHA is important in brain development, but sea life known to have high mercury content should be avoided by pregnant women. And they suggested no more than two servings per week for pregnant women. Doesn't sound like the benefits *far* outweigh the risks with that advice.

However, my study showed the benefits of DHA don't outweigh the harm of mercury in most fish. In that regard, your study never drew a solid conclusion (it did show some overall benefits for cardiovascular health when looking at contaminants vs. nutrition). And it did include studies that showed mercury was bad for neurological development, but it never drew the conclusion on whether DHA's brain development or mercury's neurological destructiveness was stronger. But you can just take DHA as a supplement without the mercury.

And both studies skip the issue that DHA and EPA (eicosapentaenoic acid, another omega-3 fatty acid) don't even come from fish!

They come from algae!

And biomagnification (the increasing concentration of a substance, like mercury, in the tissues of organisms at successively higher levels in a food chain) is the reason fish have such high levels of mercury and other toxins. But if you eat from the bottom of the food chain, you avoid that issue. Just supplement with an algae-based omega-3 product. Why not just cut out the middleman and not worry about mercury, dioxins, DDE, and PCB?

Plus, there is a neurotoxin called BMAA (beta-Methylamino-L-alanine) found in just about all seafood (and freshwater animals) that appears to have a strong link to human diseases that attack the brain and the nervous system like Lou Gehrig's disease, Parkinson's disease, and Alzheimer's disease. BMAA comes from blue-green algae (not the same type of algae farmed and used to make omega-3 supplements) and since algae is at the bottom of the food chain, every animal from the sea has the BMAA neurotoxin in it to some degree.[46]

And don’t worry about plants from the sea. They’ve been shown to have pretty much no levels of BMAA. Remember, they don’t eat other organisms; they get their food from the sun. But all animals from the water eat something smaller than themselves to survive. And since blue-green algae is at the bottom of the food chain, just about all animals from the sea and even some rivers have some amount of BMAA in them.[47]

(If you're still really worried about consuming algae for your omega-3 requirements, it looks like you might not need to take an algae-based omega-3 supplement to get your DHA and EPA, but I'll talk more about that later into the book).

When you look at mercury, dioxins, PCB, DDE, obesogen, and the neurotoxin BMAA, fish really is a sponge of toxic waste. Stay away from it.

Keep it simple, make your nutrition plant-based. Then you don’t have to worry about the toxic effects of animal products.

The Terrible Edible Egg

What about eggs? I read an article saying eggs are good for you and the dietary cholesterol isn't bad when it comes to plaque.

So we know for sure eating saturated fat is bad for our cholesterol levels, but is eating cholesterol itself bad for our cholesterol levels?

Let's take a look.

The "new science" on heart disease says it is not necessarily cholesterol, but inflammation, oxidation, and LDL (which can be broken up further into different sizes, but we are most concerned about the smallest as they can more easily get stuck in the artery walls) that are the problems.

Many people who advocate eating eggs give the following argument: eggs raise primarily the "good" cholesterol (HDL). And it may change small LDL into the larger, safer LDL, making it barely a contributor to any cholesterol driven heart disease (it may even be protective).

First of all, we've already established, when we talked about red meat, that all animal products have dead bacteria that will trigger our immune system and put us in a state of inflammation for hours. If you eat animal products at each meal, then you are pretty much in a chronic state of inflammation. So we are already on our way to heart disease with eggs if a main cause is inflammation.

Next, if you look at this meta-analysis about HDL increase versus LDL increase with egg consumption, the rise in LDL clearly beats the rise in HDL.[48] Yes, it raises HDL, but nothing compared to LDL.

But it's the big LDL. It isn't nearly as dangerous as the small LDL.

It is mostly the big LDL that is being increased and you are right that it isn't as dangerous as the small LDL.

But you greatly error by using the word "nearly."

Small LDL raises your chances of having heart disease by 63%, while the larger LDL raises it by 44%.[49] Those numbers are a little too close for me. Plus, why would I want to consume food that will raise my chances of having heart problems by 44%?

But this study shows cholesterol levels barely increase overall with egg consumption.[50]

There has always been a large increase in cholesterol right after egg consumption that will last for several hours.[51] However, a lot of the studies (especially the ones funded by the egg industry) measure these levels after fasting (usually after 8 hours or after sleeping).

And that is why there are so many studies claiming eggs barely increase cholesterol levels.

Plus, it doesn't matter that it eventually lowers within several hours (usually 3 to 7 hours) as it has been clearly shown that chylomicron (mixtures of fat and cholesterol) drip into our arteries after a high cholesterol meal and this chylomicron can build up into atherosclerosis plaque.[52]

Eggs clearly add to your cholesterol and contribute to the buildup of plaque.

By the way, the author of the study you mentioned has been paid by the egg industry (though not specifically for that one study). How much? About $500,000. You don't think that'll have some influence on how the study is done?

Remember how I talked about the possibility of some authors tweaking their results to please an industry they often get funding from?

Well, cholesterol levels don't matter. It only matters if the cholesterol is oxidized. Without oxidation, you can't get plaque.

I won't argue your last point because I don't have to. Dietary cholesterol increases LDL oxidation (by about 40%).[53]

Think about it, if you increase the amount of cholesterol in your system, but the antioxidant levels in your blood stay the same, then that new cholesterol is more likely to oxidize.

Well, this Harvard study says eggs have no effect on mortality.[54]

No, it doesn't. It says egg consumption does increase mortality if you eat more than 6 a week. That means you have to eat *less* than one egg a day. And don't people typically eat 2-3 a day for breakfast? For some people, that is 14-21 eggs a week.

If something is bad for you, you don't try to figure out a safe minimum. There is a study showing if a smoker quits before 40, he is likely to live almost as long as a non-smoker.[55] Do we tell our kids, "Hey, you can smoke just quit before 40." No! We tell them to stay away. Same with eggs: stay away.

What about the lutein and zeaxanthin in eggs to protect your eyes?

They barely contain lutein and zeaxanthin and those antioxidants originate from plants, not eggs. Again, just cut out the middleman and get your nutrition from the source.

But isn't the lutein and zeaxanthin in eggs more bioavailable?

I don't think you understand how little they contain.

You would have to eat over 60 eggs a day to get the daily recommended dose of lutein and zeaxanthin.[56]

What about the choline in eggs?

Most people already get enough choline in their diet without eggs. And too much choline is probably bad for you as it is converted to Trimethylamine N-oxide (TMAO), which appears to add plaque to your arteries.[57] So choline would be another reason to avoid eggs for heart health.

But if I eat eggs once in a while and workout, I'll be fine right?

Even if you could sidestep the cardiovascular disease issue, you still can't get away from the cancer issue. Just half an egg a day could double your chances of mouth, throat, esophageal, prostate, and bladder cancer, and triple your odds of colon and breast cancer.[58]

This increased cancer rate is speculated to be due to the choline (after it is converted to TMAO) causing inflammation in the body.[59] And wasn't inflammation one of the main causes of cardiovascular disease when it comes to the "new science" of heart disease?

Eggs have also been shown to have industrial toxins like PCB (94% of the eggs tested).[60] PCBs have a dioxin-like effect on the body by interfering with our hormones. PCBs have also been shown to cause cancer in animals.

Finally and another possible explanation for the high cancer rates, just like chicken, eggs contain potent cancer-causing viruses.[61],[62]

Just stay away from eggs.

Dairy (Far Worse than You Think)

And we have made it to the last category.

Sorry guys, more bad news.

First, let's take a big picture look like we did with red meat.

In a meta-analysis of case-controlled studies (looking at diseased and healthy people and comparing how they lived their lives), dairy consumption was shown to be a risk factor for prostate cancer. In another meta-analysis of prospective studies (following a group of people and waiting to see what kind of diseases they got), dairy consumption was also a risk factor for prostate cancer.[63],[64]

What do they mean by risk factor? Think of smoking for lung cancer. Smoking tobacco is a risk factor for lung cancer. In other words, the more you smoke the more likely you will develop lung cancer. Thus, the more milk, cheese, and other dairy products we consume the more likely we will develop prostate cancer. We'll look at some experimental studies that might explain this later.

So in a way, dairy consumption is just as bad as smoking cigarettes.

But is there a link to other types of cancer?

In another study, they showed a link to milk consumption (from cows) as a child and colorectal cancer as a senior (5,000 people were tracked from 1940 to 2005).[65]

That might sound odd at first, but it isn't surprising. Most forms of cancer get a foothold in our body during growth phases (like puberty). Our body fights it off until we get older and our immunity isn't as strong.

Is this from the hormones they inject into cows?

That might be one explanation, but studies have shown that even organic milk promotes cancer growth.

The problem is the estrogen and hormones naturally present in milk (i.e., cows do not have to get injected with hormones to have hormones in their milk). And these chemicals stimulate precancerous cells into invasive cancer cells.[66]

Why? Because milk is for babies. And what do babies want to do? Grow. But this growth signaling from hormones also signals the cancer cells to grow as well. As I mentioned above, it is during our growth phase that cancer takes a foothold in our body.

Another explanation may be IGF-1 (insulin-like growth factor 1). IGF-1 is a hormone in our body that tells us to create more cells. Necessary for when we are growing children to make sure we get bigger, but as adults we don't need it as much. The problem with IGF-1 is it tells all cells to grow (including cancer cells).

Animal protein has been linked to increased IGF-1 levels in the observational studies.[67] And the experimental studies also show that animal protein increases IGF-1 levels.[68]

So not just dairy, but all animal products (red meat, poultry, eggs, fish, and dairy) stimulate cancer growth.

Yet another reason to stay away from all animal products.

Besides cancer, milk has been linked to doubling your risk of heart attack.[69]

And guess which animal product has the most saturated fat? Red meat? Nope. Cheese.

Cheese is the number one source of saturated fat.[70] Milk itself is also very high in saturated fat. Remember how bad saturated fat is for our heart health?

And remember the 2014 Annals of Internal Medicine observational study that *tried* to show no link between saturated fat and cholesterol

levels could be traced back to someone funded by the dairy industry? Follow the money.

And what makes dairy the worst of everything we talked about so far is the addictive nature of the ingredients. This might be explained by the casomorphins (an opioid, similar to morphine, found in milk). That drug is probably there on purpose to make sure the infant calf will drink his milk and bond with its mother. This is supported by the reports of people who can easily give up all other animal products but still crave cheese and dairy after going vegan.

So while each animal product is bad in their own unique way, dairy is probably the worst due to its addictive nature.

So my advice is to not get your kids addicted to a drug.

But calcium? Where will I get my calcium?

They looked at lifelong vegan women vs meat-eating women (both in their old age) and they found no difference in bone density.[71] Apparently, the calcium in our greens is enough for healthy bones, even with the oxalates.

The Final Arguments

You're cherry picking the studies to find the ones that support your side.

We looked at extremely large studies (groups of 100,000 to 500,000 participants). We looked at meta-analysis studies. Not just one, but several meta-analysis studies.

And we looked at many studies that meat advocates cite all the time. They simply don't stand up to inspection.

Every time we examine the studies, it turns out they are the ones cherry picking (mostly by using observational studies).

Remember the study advocating fish is okay despite the contaminants, but it actually said to limit fish consumption to two servings per week for pregnant women? Or the so-called "1,000,000 person study" showing red meat didn't cause stroke and coronary heart disease, but the experimental study did show a link and the observational studies were questionable or also showed a link? How about the egg studies where they waited 8 hours after consumption to make it look like cholesterol barely increased? How about when the Masai tribe is given as an example, but the Masai work out like elite athletes and still have arteries caked with atherosclerosis plaque?

Correlation isn't causation.

True. But in *observational* studies, it is understood correlation isn't causation.

And that is why we follow up with *experimental* studies to prove our observational studies. And they do exactly that.

Like the extremely large observational studies we just talked about showing red meat being bad for you and processed being even worse. And what did the experimental studies show? The same. Red meat is bad for us and processed meat is even worse.

Furthermore, scientists are able to recreate the chemical reactions that are happening in our bodies to further explain the observational and experimental data. For example, the chemical reactions of heme iron in our colons producing DNA-damaging hydroxyl radicals explains the link between red meat consumption and colorectal cancer. And the additional creation of genotoxic N-nitroso compounds with processed meat explains why it is found to be even worse. All these reactions explain our findings in the observational and experimental studies.

At that point, the “correlation isn’t causation” argument doesn't have any weight to it.

No more headline science guys. We need the truth if we want progress.

Let’s dedicate ourselves to being great skeptics and critical thinkers.

What Should I Eat?

This book is about the effects of eating animal products. It is not a diet book.

However, I think I would be doing you a disservice if I didn't provide some guidance.

The foods I eat are based off a lot of research, but still it's just my way of doing it. And I expect a lot of people to disagree with what I say. That’s fine. Diet is a complicated issue. This chapter is here to just provide some guidance and to give some ideas you can use to create your own diet.

Do your own research. Be a skeptic of everything, even of the suggestions I give here.

And always consult with your doctor before changing your food habits.

(If this chapter seems like too much to remember, don’t worry. I have some easy to follow guides at the back of the book.)

So you have three choices.

1.) Keep eating animal products
2.) Reduce animal products
3.) Eliminate animal products

I won’t bother talking about the first option. If you choose to reduce, I think for the most part you should be okay. The less animal products you eat, the more benefits you’ll get. But I would make sure to supplement with a B12 vitamin as even some meat-eaters have been shown to be B12 deficient. Still, read what I'm about to say to everyone who will be eliminating animal products from their lives.

If you are going to choose the best option, eliminate animal products, I have a simple guide for you to follow.

First, always go for whole foods. In study after study, they always beat all the other food sources when it comes to health. Even some of the good stuff in whole foods seem to become toxic to your body when taken by themselves. You need to get your nutrition in its natural form. Your body simply does best with whole foods. This means no processed foods and no oils.

Again, B12 is a must. I would maybe take vitamin D if you don't get much sunlight where you live. If you plan on being a raw vegan, then you might need to supplement your minerals. But I'm not a raw vegan, so please seek advice elsewhere if you plan on going down that path.

If you eat starch heavy vegetables that you have to cook (beans, rice, potatoes, etc.) then you should be fine mineral wise. The same goes with protein. But if you are really worried about minerals or protein (especially if you work out a lot), then just take a protein meal shake. There are a lot of vegan options out there. And you can always stop using it later and see how you feel. (Even if you do work out regularly, I really doubt you *need* a protein shake. Personally, I think they're a waste of money.)

If you're wondering about weight loss, people who turn vegan tend to not only lose a lot of weight in fat but also tend to keep it off. It just has to do with eating whole foods. It's what our bodies are built for. The fiber and synergy of all the phytonutrients (plant chemicals that work with our systems) help our bodies perform at their optimal, which means not being overweight.

That brings me to my next point, eat beans!

Remember Doctor Ancel Keys and his wife who lived so long? They loved beans. They even wrote a book about it, *The Benevolent Bean.*

And we are finding out that beans have amazing properties. Remember how iron is a pro-oxidant? Phytates, naturally found in beans and other vegetables, are antioxidants that specifically work on iron during the digestive process. They can inhibit production of hydroxyl radicals. Yes, phytates (also called phytic acid), what many meat-based diet advocates call an anti-nutrient because it inhibits

mineral absorption. But, yet, a high phytate diet has been shown in several studies to decrease osteoporosis.[72],[73],[74]

Yes, some of the minerals will be bound and harder to absorb, but that means you just eat more. And if you combine your beans, and other high phytate foods, with those in the Allium family (e.g., garlic and onion), then the absorption of iron and zinc goes up![75]

And bean consumption is a predictor of a long life. In other words, the more beans you eat the more years you live.[76],[77]

And maybe that is why Ancel Keys lived to be over 100 years old.

It's no coincidence that the people who live in the Blue Zones, the places on Earth with the longest life spans, eat mostly or entirely a plant-based diet and lots of legumes (beans and lentils).

But many Paleo/Primal advocates warn people about the lectins in beans. So lectins are a category of protein. And this category of protein is found in both animals and plants. So technically, there are lectins in animal products as well.

Since it is a protein, a lectin's structure will determine if it is harmful or beneficial to us. Venom (not a lectin, but still a protein), for example, is very bad for us. But the protein found in sweet potatoes can help our bodies fight cancer.[78],[79]

Some lectins made by plants are designed to help them fight microbes and insects, but just because it is bad for one species, doesn’t mean it is bad for us. Avocados are toxic to birds and dogs but fine for us.

Still, lectins aren’t much of an issue as most protein structures are denatured during the cooking process. For example, in China they eat the stingers of scorpions after dipping them in hot oil. The heat denatures the protein and the poison now becomes a source of amino acids. This is why the lectins of the red kidney bean are no longer toxic to us once we cook them.

And depending on their structure, lectins can be good for us. Several plant lectins have been shown to have anticancer properties when they are in our bodies.[80]

But before you go eat some raw beans (don't do that), new studies show that cooked beans appear to have a much stronger anti-cancer effect than raw or sprouted.[81]

And studies have shown beans do not give you gas. So don't use that as an excuse.

Finally and you're probably still wondering why I started to talk about beans after talking about weight loss, beans are very low on the glycemic index. Not only are they extremely low, but they seem to blunt the glycemic load of foods eaten within several hours.[82]

But don't go only by the glycemic index. Potatoes are one of the highest foods on the glycemic index. But when you eat whole foods, you get a lot of protective properties, like fiber and phytonutrients. And this is proven by the fact a man ate only 20 potatoes a day for 60 days and lost weight, lowered his cholesterol levels, and his blood sugar levels stayed the same. Again, great things start to happen when you start to eat whole foods, it's what your body wants. Plus, potatoes have all the essential amino acids and lots of minerals. So eat potatoes, I certainly do.

In general, the less animal products you consume and the more fiber you eat (like beans, potatoes, and vegetables), the thinner your waist will be. It's no coincidence that vegans tend to be a lot thinner, especially in the waist, than meat-eaters.[83],[84],[85]

Okay, so we are taking our B12 (maybe vitamin D) and eating our beans and potatoes.

Next, eat your fats with your salad. We are staying low-fat, but when you do, eat them with your greens. There are a lot of fat-soluble nutrients in raw vegetables you can't get unless you consume them with fat. But no oils or dressings. Remember, we are doing whole foods only. So basically eat your nuts with your salad.

It may sound impossible to enjoy a salad like that but it isn’t. Today I had a salad with spinach, kale, flaxseeds, raisins, cranberries, walnuts, and sunflower seeds. It was great. Try it! (If you don't like the taste of flaxseed, I suggest you put it in your oatmeal as you won't taste it at all like that. It's only a little bit of fat to your breakfast and the phytonutrients in them are worth it.)

And speaking of flaxseed (high in omega-3s), make sure you eat more omega-3 fats than omega-6 fats. But don’t exclude certain nuts because of their high omega-6 profile. Variety is the key to being healthy.

With omega-3 fatty acids, there is some new science suggesting that ALA (the plant form of omega-3 found in flaxseed and chia seed) is adequately converted to DHA and EPA (the two other types of omega-3s) for vegans. However, this can't happen if you eat too many omega-6s. So it's only really an issue if you eat too many processed grains like bread, chips (they usually have saturated fat in them too), pastries (they often also contain eggs), and cereal or if you use too many cooking oils high in omega-6s. So you don't need an algae-based omega-3 supplement to get your DHA and EPA, but you can take it if you want.

When it comes to processed foods, I know you're probably going to buy some at the grocery store for variety and to have something tasty to eat. While we should be aiming for only whole foods, I can understand why you would do that. I do the same. However, many products, even those marketed as vegan and vegetarian, are loaded with saturated fat and sodium (sodium/salt will increase your blood pressure and that will weaken your arteries over time). I don't know if I made this point clear in the book but, except for what you find in nuts and coconuts (whole foods), you should be aiming for *zero* saturated fat in your diet as, like cholesterol, your body makes all that it needs. Even with whole foods, it's probably best to err on fewer fats than too many. With processed foods, all I can advise you to do is to get in the habit of reading nutrition labels and don't let yourself binge too much on the bad stuff. Nothing wrong with enjoying yourself once in a while

(what's the point of living longer if you don't enjoy it?), as long as you are aware of what you're getting yourself into.

To recap on supplements, as a vegan always have B12 and vitamin D with you. Always take B12, but you only need vitamin D if you don't get enough sun that day (or if you live way up north or south from the equator where the sunrays are too weak for your body to use). And depending on your personal needs, an algae-based omega-3 supplement and a vegan protein supplement. Finally, even if you are taking an algae-based omega-3 supplement, consume some flaxseeds each day for the omega-3s and phytonutrients.

For food, what I usually eat for the day is what I called the simple three: oats, greens, and beans. (It's a play off of Dr. Greger's advice/rhyme of eating your greens and beans as they are two of the healthiest foods on the planet. I think he would agree that berries are a close third and that's what you put on your oats.) That's your breakfast, lunch, and dinner. Of course, it isn't that simple as you need to add others foods to get all your nutrition (e.g., rice to your beans, nuts to your greens, and berries to your oats). Also, you can always swap out foods for variety (for example, potatoes, sweet potatoes, or whole wheat noodles instead of beans for dinner). And when I say greens I mean healthy greens like kale, spinach, and collard greens, not greens with low nutritional value like iceberg lettuce. You always want dark greens. They have more protein and antioxidants. Darker colors in plants usually mean more nutrition. Red onions, for example, have more antioxidants than white onions. So go for those rich, dark colors in plants.

Here are the simple three in more detail:

Breakfast: Oatmeal with frozen mixed berries and flaxseeds.
Lunch: Salad (mixed greens and kale) with walnuts, almonds, and sunflower seeds.
Dinner: Legumes (beans or lentils) and rice.

Nothing too complicated. I mostly consume beans, rice, and potatoes. They are my big meals of the day to make sure I get enough protein

and minerals. And, frequently, I'll have other smaller meals or snacks like air-popped popcorn, microwave some frozen vegetables (corn, okra, green beans, broccoli, etc.) or vegetable soup, or an apple with almond butter.

If I buy canned beans (always look for low or no sodium), I can just use the microwave for all my cooking. For rice, I either get the microwaveable rice or I'll use a crock pot. But if you notice everything else is easily cooked in the microwave. You can even microwave potatoes. But if you do that, rinse them so they are wet before you put them in or else you can start a fire.

(After doing a lot of research, it looks like microwaving is no worse than any other cooking method. It might even preserve the most nutrients.[86] Don't believe the random internet articles out there. It's not possible for microwave energy to stay on your food once the oven is off. Plus, it's non-ionizing radiation. That's the kind of radiation picked up by your AM/FM radios, cell phones, and produced by your WiFi router. And infrared non-ionizing radiation, what is produced by your microwave, is the same stuff produced by fire and sunlight. You aren't scared of a campfire or a beautiful, sunny day, are you? Keep in mind, people who get regular sunlight, for whatever reason (vitamin D, nitric oxide, dilated blood vessels, etc.), tend to have healthier hearts and lower cancer rates. (However, the sun can damage the skin and make it look older with wrinkles, age spots, and such (photoaging). So how much sun you want to get is up to you, but *never* let yourself get sunburned.) But even if you are still afraid, a little bit of the more dangerous *ionizing* radiation has been shown to be good for your health. Like a workout, your body adapts to the stress and becomes stronger. So non-ionizing radiation should be nothing to worry about.)

But do try to add variety as much as you can. For example, I try to include different spices (e.g., turmeric, oregano, and basil), mushrooms, onions, garlic (freshly crushed garlic has very strong anti-cancer properties), corn, broccoli, okra, etc. in my beans and potatoes. I'll use date sugar (crushed dates so technically a whole food) and pumpkin pie spice in my oatmeal and sweet potatoes. And my salad has all types of vegetables (beets, bell peppers, carrots, kale, arugula,

watercress, etc.). You get the idea. It is all about variety to make sure you are eating healthy.

But that is just my way of doing it.

And when you start being a vegan, I would suggest you put what you eat into a food tracker for the first few weeks. This way you can get an idea what it takes to get your daily nutrient intake recommendations and you athletes can make sure you're getting enough calories, protein, and minerals for your activity level. As far as exercise goes, I'll just say being active each day (walking, gardening, taking care of your yard, etc.) is way more important than working out. Exercise is great, but being active, instead of sitting in a chair for 8 hours a day, is way more important as an hour of exercise a day won't undo the damage of a sedentary lifestyle. Lately, I've been using Cron-o-Meter (cronometer.com) as my food and activity tracker. (Just use the Recommended Daily Allowances (RDAs) in these food trackers as a general guide as they will probably change in the future as our understanding of nutrition improves. Besides, they're only recommendations for your *average* person.) While using Cron-o-Meter I realized I was a bit low on calcium and riboflavin. So I added a cup of soy milk to my diet.

Yes, soy milk is technically a processed food (soybeans or edamame would be healthier), but it's better than cow's milk. And don't worry about the phytoestrogens in soy milk unless you are drinking a gallon a day. Even for infants, consuming soy showed no effects on growth or reproductive health.[87] Soy even has isoflavones with antiestrogenic activity which might help to neutralize the phytoestrogens' hormonal effects.[88] There is a reason why soybeans have been used for millenniums. Plus, phytoestrogens appear to be protective against several cancers.

For drinks in general, needless to say, stay away from the soda drinks and sugary beverages, even if they are plant-based. Your body needs the fiber to process the sugar properly. Sugar, when consumed *without* fiber, has a strong association with pancreatic cancer.[89] Steve Jobs, who was mostly a vegan, was known for drinking energy drinks, fruit

drinks, and fruit smoothies all the time, and he died of pancreatic cancer (the type that comes from overactive insulin cells). (If you're now worried about your insulin levels and that type of pancreatic cancer, you should read what I have to say about saturated fat in the next chapter.) But if you do make your own fruit drinks, use a blender (so that the fiber is still in there), not a juice extractor. But even then the fiber is broken down making it less effective (we know this by the higher spike in insulin from blended foods compared to their whole food forms). Bottom line: your body prefers your fiber intacted (i.e., don't turn your whole foods into processed foods by putting them in a food processor).

Teas are generally not just good but great for you. (They come from plants. What did you expect?).[90],[91],[92],[93],[94],[95] However, some of the more exotic ones have been found to be slightly toxic.[96] (Like I said, they come from plants and some plants are bad for you.) So if you stick to the popular ones you should be just fine (green tea, peppermint tea, hibiscus tea, etc.). What about coffee? The studies show that coffee is both good and bad for you. So, unless you need it to wake you up or you really like the taste, I don't see why you would consume it. Hot chocolate, on the other hand, is great for you as long as you don't have it with all that sugar in it.[97] Just keep in mind, heat damage can lead to cancer. So regardless of what you drink, try to avoid burning your mouth and throat.

(I know there are probably some avid coffee drinkers who want to know more about coffee so I decided to add this rather long paragraph to the book. We're still learning about coffee but this is the best information I could find. Again, do your own research when it comes to your diet. Coffee has been shown to decrease the rate of several cancers and to be protective against several neurological diseases (probably from the caffeine as it's an antioxidant).[98] It also protects you from liver fibrosis (scarring of the liver).[99] While most of the studies I see say it lowers blood pressure, some say it increases blood pressure, and some show no difference at all. And when it comes to blood clotting factors/deep vein thrombosis, I've seen studies, both observational and experimental, that suggested a decrease, but I've also seen studies,

both observational and experimental that suggest an increase. While I wish I could find a definitive answer, it looks like we just need more studies. However, what we know for sure is that coffee has been shown to increase LDL and homocysteine levels.[100] That's why I said it's both good and bad for you. But this is caused by the diterpenoid alcohols/diterpenes, which can be greatly reduced by using a paper filter (i.e., pouring your coffee through a paper coffee filter).[101] Before you get too worried about LDL and your homocysteine levels, keep in mind, an experimental study showed just one cup of filtered coffee a day significantly protects LDL from being oxidized.[102] (Remember, it appears LDL must be oxidized before it turns into plaque.) And another study, though observational, showed changes in homocysteine levels were insignificant if you had 2 cups or less of *filtered* coffee unlike *un*filtered coffee which showed a direct linear increase even at low levels.[103] And another study showed *no* change in homocysteine levels for up to 4 cups of paper filtered coffee.[104] While it may seem like a good thing to remove these diterpenoid alcohols, those same alcohols also appear to have antimicrobial, anti-inflammatory, and anticancer properties.[105] Coffee is a chemical soup and the type of bean, roast, and extraction method could all result in a different final product. (Perhaps this is why we get various results on blood pressure and blood clotting factors.) Thus, it's hard to say what chemicals are playing what role in your body. So there is some concern over coffee increasing cancer rates from some of the thousands of chemicals found in it. Acrylamide, created during the roasting process, is one such example. But we still don't know if acrylamide causes cancer in humans or not. And a review study looking at several meta-analysis studies and recent studies saw no correlation between coffee consumption and increased cancer risk except for what might be a slight association with bladder cancer for *heavy* coffee drinkers. Most of the studies reviewed defined heavy coffee drinkers as having more than 5 cups a day.[106] (However, I believe this is probably coming from the chlorine in the tap water, not the coffee itself, as most heavy coffee drinkers, I assume, are brewing their stuff at home. And I believe the reason that we *don't* see the same issue in other tissues exposed to coffee/tap water, like the colon, has to do with coffee having some very strong anticancer properties on

those specific tissues.[107] I'll talk more about chlorine being in your tap water later.) The review study showed there might also be a weak link between heavy coffee drinking mothers and childhood leukemia. But keep in mind, the vast majority of the studies reviewed showed *no* link between maternal coffee consumption and childhood leukemia. Still, I think a good rule to follow is to not have pregnant women, breastfeeding women, or children drink coffee. But, overall, it clearly decreases cancer rates regardless of the acrylamide from the roasting process. But if you're thinking about getting a lighter roast to have less acrylamide, the dark roasts actually tend to have the lowest levels.[108] But, honestly, brewed coffee is very low in acrylamide unless you are drinking instant coffee, a coffee substitute, or some unusual brew that contains the coffee grounds themselves.[109] The coffee bean is actually green when found in nature. The roasting process is what makes it that dark brown color. You can use the green coffee beans to make coffee, but you still need to cook the beans (most people boil them) to break down the bad chemicals naturally found in them (just like we do with red kidney beans). Finally, an umbrella study looking at over 200 meta-analysis studies, though the vast majority were observational, showed that coffee drinkers (with the optimal being about 3-4 cups a day) had a decrease in cardiovascular disease, cardiovascular death, cancer, and all-cause mortality.[110] However, the same study did say the only people who *shouldn't* drink coffee are pregnant woman as we see an increased rate of premature birth, low birth rate, and pregnancy loss. This might be a "correlation is not causation" issue (as a lot of coffee drinkers also smoke cigarettes), but I wouldn't risk it. You might be interested to know that this umbrella study saw no significant correlation between coffee consumption and venous thrombosis. It also saw a slight decrease in both types of blood pressure for coffee drinkers. Despite the study favoring 3-4 cups a day, given what we know about diterpenoid alcohols and other possible problems with coffee, I would play it safe and go for no more than two cups a day and let your other foods and teas play their role in keeping you healthy. So a cup or two of *filtered* coffee a day should be a healthy addition to your diet. If you want to brew your own coffee at home, you don't need a coffee maker. Just put your grounds and paper filter on a strainer over a coffee cup. Then pour hot water (I just heat it

in the microwave) over it. it’s about 2 tablespoons of coffee grounds per cup. But if you don’t like coffee, other plant foods will give you some of the same benefits without you having to worry about the LDL increase or caffeine buzz.)

But you can always just stick to water. I prefer to put a little bit of vitamin C (ascorbic acid) in it to neutralize the destructive chlorine and its byproducts.[111] (Chlorine, an element and a disinfectant, required by the EPA to be in your tap water and found in some bottled waters, has a link to bladder and rectal cancer (the rectum is the last part of the colon).[112],[113] While chlorine isn't technically bleach (it's *in* bleach), it's the main reason bleach works. The chlorine interacts with your tissues to create trihalomethanes (THMs), which in turn create free radicals, genotoxic compounds, and/or cytotoxic compounds (compounds that damages the cell with or without direct DNA damage) in your body.[114] So chlorine is sort of like heme iron.) Lemons, limes, oranges, crushed pomegranate seeds, hibiscus tea, or anything with vitamin C will neutralize it. However, the acids in fruits can put your teeth in a weakened state, so you shouldn't go overboard with the lemon nor brush your teeth right after drinking it. But you can always drink it through a plastic straw (or a glass straw if you want to avoid plastics). I know drinking through a straw is unnatural, but so is having chlorine in your water. (An activated carbon water filter will reduce total chlorine by about 50-70% per one older study I saw some time back. I haven’t been able to find it again, but I believe the study was done in the 80s. So the filters today might do a better job. A reverse osmosis system does the best, but it removes pretty much all the minerals in water including ones that seem to be protective for your heart. Activated carbon will tend to leave these minerals in there. I'll talk more about the minerals in hard water in the next chapter.)

It seems like a few in the vegan community advocate fasting so I'll cover it here. The science shows, more or less, it can be both good and bad for you, like coffee. However, the bad parts seem to come in more and more the longer you do a fast like getting dizzy or passing out when standing. A few people have died from that (e.g., falling down the stairs). I've heard many vegans say, while they felt like they got

some health benefits from it, they also felt like they did permanent damage to their bodies with a long water fast. I don't know if you can really design a study to prove this or not. But keep in mind, the vitamins and minerals in your body will decrease more and more, especially the water-soluble ones, the longer you do the fast. And not having enough vitamins and minerals in your body will definitely damage it. And you could die from an electrolyte imbalance (your heart can't pump blood) if you have kidney disease. So I would never recommend something like a 30-day water fast. It just seems too risky, especially if you are in bad health. That being said, the vast majority of people do water fasting without any problems (besides headaches and such). As to the benefits, some studies suggest a boost in brain power/new brain cells, a maintenance mode (cells cleaning and repairing themselves) being activated by the body, and weight loss (especially when it comes to fat). But exercise will give you a lot of the same benefits. Perhaps not in the same quantities (it probably gives more brain boosting power and less weight loss than fasting), but when combined with a healthy diet it'll pretty much give you what you want. But if you do want to fast, at most I would recommend a morning fast (eating your first meal late in the day), a one to two day fast once a week (interestingly, hospitals often treat pancreatitis by having you essentially do a water fast for a few days to give the pancreas a break), or an every other day fast. And, still, get approval from your doctor first. If you do fast, keep in mind LDL (including small particle LDL) will increase and your blood will thicken as it starts to release fat to be used as energy.[115] This will make you more susceptible to sudden heart diseases and blood clots during this time. (So only healthy people should do a fast. Overweight people and those with heart conditions are better just eating fewer calories at each meal and plant foods have a very low amount of calories per volume.) But if you still plan on doing a fast, I would suggest you drink a lot of water (especially lemon water as it'll help with the LDL) and get plenty of movement to keep your arteries healthy.

But seeing that fasting is both good and bad for you, the only reason I could see anyone doing it is to accelerate/help the weight loss process as having a simple rule to follow is an easy way to restrict your

calories. Personally, I don't think anyone should bother doing any type of fasting. While they don't admit it, most people do fasting to lose some vanity pounds. But chances are you gained weight because of a diet based around saturated fat and animal products (like I said, I'll talk more about insulin sensitivity and saturated fat in the new chapter after this one). And when you start eating only whole foods, you should see the weight come off gradually (as studies have found over and over again). Like I said before, vegans on average tend to be slimmer and weigh less than people who eat meat. Eat your fruits and vegetables! But, if you're healthy, you shouldn't feel too bad about eating a late breakfast or skipping it once in a while.

Finally, you can make yourself into an experimental study. Go to your doctor and have them check your cholesterol levels, C-reactive protein levels (inflammation markers), and blood pressure. (There are a lot of things you can get tested for but starting with the number one killer in the world might be a good idea.) Then go on a low-sodium, whole-food, plant-based diet (with some B12, of course) while keeping everything else the same. (But if you smoke, drink, or live a sedentary life, forget about doing an experimental study and stop abusing your body.) Then see where your levels are at in a month. And then you'll have proof that a diet based on plant food is best for your body.

Again, do your own research and find out what works for you.

That’s it.

I hope this is a solid foundation for your new journey to a healthy lifestyle.

Take care and never stop learning!

And, No, Salt Is Not Good for You

While this book was supposed to be only about animal products, I ended up going back and adding this chapter here as just how the animal product industries appear to be putting their spin on the science the salt industry also seems to be playing that same game. So I wrote this chapter (which could probably be its own book).

I should warn you, unlike the first half of this book which is pretty clear, concise, and easy to read, the analysis gets pretty deep here. For animal products, not only do we not need to eat them but the less we eat the healthier we tend to be. With sodium, however, while too much is bad for you, it is a necessary nutrient. And figuring out how much we need takes some good analysis of the studies and a bit of math. But, trust me, there is an answer backed by the science.

Before we get into the spin from the salt industry, let's first understand what salt is and how it affects our bodies, and then we'll look at the long-standing science saying salt is mostly, if not entirely, bad for you.

What Is Salt?

The first thing you have to understand is salt and sodium aren't the same thing. Salt *contains* sodium in the form of sodium chloride. So to better understand salt, let's back up and understand the element sodium.

The sodium atom is usually a positively charged one (a positive ion because it has one more proton than its total number of electrons). So this atom attracts negatively charged atoms and molecules (and water molecules as they are negatively charged on one side). Thus, when you have more sodium in your blood, it attracts more water into your arteries, and that increases your blood pressure. But when sodium is already combined with a negatively charged ion(s), it's neutral (like sodium bicarbonate or what we know as baking soda) as the ions

balance each other out and, thus, those compounds can't affect our blood pressure. However, with the compound sodium chloride (table salt) your body breaks the bond to get to the chloride ion so it can be used for various systems.

But you can get plenty of chloride already from plant foods. And too much chloride (like the amount found in processed meats, cheeses, and table salt) will increase your blood pressure just like sodium does (it is a *negatively* charged ion which also attracts water as water molecules are positively charged on its other side).

And when people argue about sodium or sodium chloride being worse, it seems very much like the red meat versus processed red meat argument. Too much sodium by itself is bad for you, but too much salt (sodium chloride) is probably worse as the chloride can also add to your blood pressure.

But back to sodium.

With sodium having a strong positive charge, it is rarely found in nature without already being combined to another molecule (except for animal blood where it is suspended in water and other electrolytes and, not to get too technical here, small amounts are around our cells for various cellular processes but about 85% of your sodium ions are in your circulatory system).

That means, for the most part, you'll only have problems with sodium if you take it in the form of table salt or sodium ions suspended in a solution, like water or blood.

(If you're wondering about animal flesh itself, I was surprised. *Pure* meat is pretty low in sodium. Not as low as plant foods, but at 50 milligrams a serving you would need to eat about 6 pounds of beef to go over most sodium recommendations. But when you consider all that saturated fat, don't even think about it. Plus, almost all meats are seasoned with salt. And cheese and processed meats are often made with some insane amounts. Just stay away from animal products.)

So increasing the sodium ions in your body to unnatural levels usually means either eating sodium chloride (table salt) or processed foods containing table salt, drinking animal blood (why?) or eating processed/salted animal foods (a lot of animal foods you think aren't processed are still injected with a salt brine), and drinking soft water.

What is soft water, you might ask? Soft water systems found in homes replace suspended hard minerals (like calcium and magnesium ions) in tap water with softer minerals (usually sodium or potassium ions). The idea is that soft water works with soap better and you won't have calcium build up in your pipes and other places. While the sodium in it is in small amounts, we'll see later that even small changes in sodium can affect blood pressure. So it's no surprise when we compare people who drink soft water to those who drink hard water (regular tap water), those who drink soft water tend to have more heart disease. The evidence is there, but it's weak, probably due to the small amount of sodium in soft water (about 100-250 mg (milligrams) is consumed in a day, which is just enough to start to make a difference, but it's over 500 mg if you're drinking a gallon a day). Still, why drink something that might harm you? But if you do use a soft water system at home, potassium salts are healthier for your heart. I'll talk about the benefits of potassium later. However, considering how expensive potassium salts can be and how some of the health benefits of hard water might be coming from the minerals in it (especially the calcium and magnesium), you're probably best sticking to regular old tap water and getting your potassium from your foods.[116],[117],[118],[119]

Just think about it. We went for most of humankind without any salt. (And when you consider meat is naturally low in sodium, I find it odd how some in the Paleo movement seem to be pro salt.) It wasn't until we discovered that salt could preserve foods did we start adding large amounts of it to our diets. So why would people think salt would be good for us? It isn’t found out in the wild. That increase in blood pressure just isn't natural for our bodies.

The Evidence

Blood Pressure

Now that we understand the molecular science going on, let's look at some studies to back this up. First, the observational studies.

A study looking at the blood pressure of thousands of children each year for about 15 years showed the strongest link had to do with sodium consumption.[120]

In an EPIC study looking at 23,000+ adults, it showed that more sodium consumed meant more blood pressure.[121]

Finally, the INTERSALT study, a worldwide epidemiological study (studies that look specifically at a disease and typically have experts in that field working on them), done with 10,000+ people in 32 countries showed increasing sodium intake increased both systolic blood pressure (pressure when your heart beats) and diastolic blood pressure (pressure while your heart is resting).[122]

Furthermore, the study was done in the 80s but another study re-evaluated it in the 90s and said the findings were still true today. One of the authors of the new study later went on to say that the findings are consistent with all known studies at the time (1997) including clinical observations, therapeutic interventions (experimental studies), randomized controlled trials (experimental studies), animal experiments, physiological investigations, evolutionary biology research, anthropological research, and epidemiological studies. We'll be looking at our own experimental studies soon.

So clearly, high dietary sodium intake is a risk factor for high blood pressure.

But let's take it further like we did with the Masai and the Bantu for saturated fat.

Let's look at a tribe that doesn't take table salt (as they've had very little contact with the modern world), the Yanomami Indians of the Brazilian rainforest. They have the *same* blood pressure from birth to death (which sounds pretty normal to me), unlike people in civilized society

who have a systematic increase as they age (which sounds pretty abnormal to me). Some will argue that you need certain levels of salt/sodium for health reasons (like allowing our nerves to carry electrical signals and having enough blood pressure for our hearts to pump blood). But sodium is naturally present in our foods and, apparently, these tribes, who don't even know what salt is, get enough to live into old age. (Like our caveman ancestors, their lifespans are shorter than ours as they don't have access to modern health technology and they're living in a very dangerous place, the Amazon rainforest. But even those who are very old for a Yanomami, around 60, have the same blood pressure levels since birth.)[123]

As for the extreme societies that eat salt to compare them against just look at us. How much stroke and hypertension (high blood pressure) do we have?

Now for the experimental studies. They also show that more salt equals higher blood pressure.

All animals tested on have been shown to suffer from higher blood pressure when more salt is added to their diet.[124],[125]

Why am I mentioning animal studies instead of human ones? Because *every* animal tested, even our closest relatives, had their blood pressure increase when sodium was increased. The more salt *any* animal gets, we are animals after all, the higher the blood pressure. Don't you think there's a reason why animal flesh is low in sodium and comparable to that of plants? And the few animals who evolved eating a high sodium diet developed special mechanisms to get rid of it like the marine iguanas in the Galapagos islands who swim in the ocean for food. They have cranial glands to filter the sodium out of their blood which is then shot out their noses. Before you argue our ability to sweat, you would have to sweat *heavily* for more than an hour before you lose a good amount of sodium when you consider how much we get in our Western diet (since we lose sodium through sweat that is probably why we crave it so much in the first place). And most Americans don't sweat each day. When was the last time you had a

good sweat? (For all you athletes that do, I'll be talking in-depth about this later.)

And the human experimental studies? The same thing, the more salt they eat, the higher the blood pressure.

It was true for healthy, elderly subjects without hypertension.[126]

And patients of various ages already with hypertension were able to treat it without drugs by lowering their salt intake.[127]

And an experimental study with almost 500 participants reducing salt *alone* reduced blood pressure regardless of hypertension or not, race, and gender (but the people who also ate more fruits and vegetables did even better, though salt reduction had the greatest effect). The interesting part was it happened in a "stepwise fashion." In other words, even a little bit of salt out of your diet meant a little bit of lower blood pressure. And it did so significantly. "[R]eduction of sodium intake significantly lowered systolic and diastolic blood pressure[.]"[128]

So we keep talking about salt and sodium increasing our blood pressure. But is that really bad for us?

If you don't understand why high blood pressure is bad, think of pipes with pressurized water in them. With enough pressure, the pipes will burst (or at least weaken over time).

And that's why you get things like hemorrhagic strokes (strokes from ruptured vessels), transient ischemic attack (strokes from blood clots, I'll talk more on how high blood pressure can create blood clots later), heart deformities, and it might even play a role in varicose veins (those veiny lumps you often see in the legs of older people). Yes, the heart and arteries can heal themselves, but they need time to do that (that's why athletes with a low resting heart rate often have such healthy hearts, they have more time to heal between each beat). And that high blood pressure is probably actively damaging your arteries or forcing them to heal in a deformed manner. And once there is a deformity in

your circulatory system, it's very unlikely for it to go back to normal. Sodium damages your heart.

Morality

But to prove that, instead of just looking at studies linking salt/sodium consumption and blood pressure, let's look at studies showing salt/sodium consumption being connected to mortality.

Again, let's look at the observational studies first.

A 12-year prospective follow-up cohort study was done with more than 4,000 randomly selected men and women and took 24-hour urinary sodium excretion from them (the gold standard in measuring sodium levels). It showed that 13.7 daily grams of salt consumption (5.5 grams of sodium) double the chances of heart failure compared to those who consumed only 6.8 grams (2.7 grams of sodium).[129]

Finland started a national campaign since the mid-1970s to decrease sodium consumption and increase potassium, calcium, and magnesium consumption. As a nation, not only did blood pressure drop, but there was an 80% decrease in both stroke and coronary heart disease mortality.[130]

There was a meta-analysis study of sodium in regards to stroke and total cardiovascular disease following 177,025 people for 3.5 to 19 years that showed high salt intake as significantly increasing the risk of stroke and total cardiovascular disease.[131]

And, finally, a prospective cohort study of a nationally representative sample of 12,267 U.S. adults tracked over 15 years showed that those with the most sodium meant a 20% increase in all causes of death during that period. (Compared to the average American, who is already "sick" with too much salt and death. Meaning that'll be a much higher percentage compared to the Yanomami Indians). And those with the lowest sodium and highest potassium consumption (potassium has heart benefits, which, again, I'll talk about later) decreased their chance of death by cardiovascular disease by 45% and death by ischemic

heart disease (another name for coronary heart disease and coronary artery disease) by a whopping 215%.[132]

You're probably wondering how sodium is playing such a strong role in death by coronary heart disease since coronary heart disease is only caused by plaque. While only atherosclerosis plaque causes it, heart attacks (lack of blood to the heart, also known as myocardial infarction) often come when that plaque is ruptured and then a blood clot forms in the coronary arteries which can then block blood from going to the heart. (Or if a clot develops somewhere else, it can travel to your lungs and kill you.) That pressure from sodium probably makes it more likely for that plaque to rupture. This logic would explain why most heart attacks happen during exercise (like during a game of basketball) or on Monday when people are stressed about work as each activity temporarily increases your blood pressure. (Of course, regular exercise should *decrease* your average blood pressure over time.)

And it would explain this high percentage number coming from sodium consumption as death from heart attack is labeled as death from coronary *heart* disease, which is also called death from coronary *artery* disease (CAD). (To be clear, ischemic heart disease, coronary heart disease, and coronary artery disease are all the same thing. Basically, they all refer to plaque restricting blood flow in the arteries of the heart. Don’t know why we have so many names for the same thing.) And, again, we would expect groups like the Yanomami Indians to have an even bigger percentage difference if any deaths at all.

We'll talk about some experimental studies in regards to mortality later, but for now let's look at some counterarguments and what appears to be spin from the salt industry.

The Counterarguments

So here are some popular counterarguments given by people who advocate a higher sodium intake or staying at the same (high) amount for the Western world.

Sodium is needed for proper infant development.[133]

That study was looking at other studies that looked at baby rats. And they gave them an *unnaturally* sodium deficient diet. Like I said, sodium is naturally present in whole foods so deficiency isn't an issue for those who eat their fruits and vegetables. And the children of the Yanomami Indians (who add no salt to their diet) develop just fine. Sodium is an essential mineral for the human body, but we get plenty of it from plants.

But salt is needed for your brain. The kainate receptor is fundamental for normal brain function. And it needs salt to work.[134]

Looking at that study, they tested that brain receptor in solutions with and without Na+ and Cl- present (after a computer simulation prediction). So they tested sodium and chlorine ions, not table salt (chlori*d*e is a negatively charged chlori*n*e atom and because of that charge it doesn't have the same disinfectant properties). (Interestingly, it doesn't look like they tested sodium ions or chlorine ions alone, only together.) But like I said, sodium and chlorine ions are already present in our blood and last time I checked blood still goes to your brain (though I wonder about the people who advocate a high-sodium diet).

We have about 16,200 milligrams and 18,000 milligrams of sodium and chloride, respectively, already in our blood. And we have even more floating around our cells, including our brain cells.

(We actually have more sodium ions than chlorine ions in our blood. Grams is a measurement of mass and the sodium atom is 35% lighter than the chloride atom. So we have about 40% more sodium atoms in our blood than chloride atoms. 18,000 x (1 - 0.35) x 1.4 ≈ 16,200 with roughly a 1% difference from rounding the percentages.)

And your body tries to keep your sodium and chloride at a certain level, so if you eat more salt, it doesn't necessarily mean you'll have more kainate receptor activity. And that's probably a good thing.

If you ever study brain science, needless to say, it's complicated. You can't really say a receptor is good or bad. And it's hard to say how necessary one receptor is.

But it's interesting to see that kainate receptors might be linked to drug addiction. While our understanding of the kainate receptor is still new, it seems to play a role in synaptic plasticity (changes in the brain). And it seems like the more receptors you have the more sensitive the brain might be to drugs like alcohol and cocaine.[135]

Thus, it wouldn't be surprising that the more you have, the more likely your brain will change in response to mind-altering drugs. And maybe it's not the number of receptors you have, but the number activated. So if you have a high salt diet, it might activate more receptors, and then you might be more susceptible to becoming an addict. But if you're on a low or no salt diet, maybe you're less likely to become addicted to things. But that's just speculation. The point is, you can't say kainate receptors are fundamental to the brain and, thus, we need to eat more table salt. That's a silly argument. And we have plenty of sodium and chloride in our bodies already.

Well, this study says you are smarter with more sodium.[136]

And this study says you are smarter with *less* sodium, especially in the long-term.[137]

The difference between our two studies (both observational) is that mine is a cohort study, while yours is a cross-sectional study. While we've already talked about the limitations of cross-sectional studies before, one thing I didn't mention is that it's a snapshot in time. A cohort study, however, follows people and their habits (this one did it for three years). That means we can not only see the long-term results but it's also more experimental in nature (it gets more to the cause and effect).

So if you want to be smarter, you're probably better off *reducing* the sodium in your diet.

But going from a high salt/sodium diet to a low one can hurt insulin sensitivity and elevate angiotensin and renin levels.

Keep in mind those last hormones you talked about are the ones that regulate blood pressure. So, of course, they are going to change when you remove foods/ingredients that affect your blood pressure as your body is trying to keep everything in balance. You need those hormones to elevate to keep your blood pressure at a certain level, or else your heart won't be able to pump any blood. You would die!

So the more sodium you drop, the more it'll elevate those levels to keep you in balance. And that's why large increases of those hormones are typically only found in extreme adjustment cases.

But even then, those levels are naturally found in the Yanomami Indians we talked about who don't eat salt and their blood pressure stays the same for their entire lives. So those hormones shouldn't be considered elevated. They're probably pretty normal. We just have a society "sick" with salt.[138]

In regard to insulin, this study showed your insulin levels go back to normal (and it emphasizes the fact that it only happens in acute cases and, even then, the effect quickly disappears).[139]

(I should have covered this already in the book, but a lot of insulin problems come from too much saturated fat in your cells. It blocks the intracellular mechanism that responds to insulin, so your body (your pancreas) keeps pumping out more insulin trying to get a response. Yes, sugar will spike your insulin levels, but only fat can block the message and thus hurt your insulin sensitivity. And once you spike the fat in your blood through diet, your intramyocellular lipids levels (fat inside the cells) start to increase as well as insulin resistance. Just another reason to avoid animal products. Plant fats in the studies, however, like polyunsaturated and monounsaturated fat, either improved insulin sensitivity or didn't affect it at all. But, all fats are extremely calorically dense. Don't be adding pure oil, even plant oil, to your vegetables. Remember, no extracts. We're on a *whole* foods diet. And that's probably why the guy who ate almost nothing but potatoes

(so very little to no fat) lost so much weight. Potatoes are full of starch (sugar) but his blood sugar levels stayed the same because your body knows how to process it when it comes from a whole food.[140],[141],[142],[143])

But there are several studies showing less sodium, at the levels you suggest, equals higher blood pressure and more heart disease like this one.[144]

That was a study done in Korea and it admits that the lack of potassium was the cause of heart disease in the study. And if you look at the numbers, the group showing the lowest heart disease (the highest sodium consuming group) was the only one barely getting close to the *minimum* recommendation of 4,700 mg of potassium per day. And each group that reduced sodium was also reducing their potassium as well. Not only does potassium play several roles in heart health, if you don't get enough potassium your body holds onto sodium. So even if you're consuming a low sodium diet but not getting enough potassium, that sodium will be kept in your blood, add to your blood pressure, and, ultimately, destroy your cardiovascular health.

These observational studies tend to come from Asia, especially Korea, as most of them get their vegetables (their potassium) from high sodium sources like seaweed (most are high in sodium), consuming them with soy sauce (very high in sodium), stews and soups that are highly salted, or vegetables that are pickled like kimchi (pickled foods are very high in sodium). It's another case of abnormal observational studies being preached as gospel without looking at the experimental studies just like we saw with animal products.

(Let me break here and talk about seaweed as we'll be discussing it a lot for another topic. Nori sheets, what is used to make sushi rolls, have almost no sodium in them whatsoever. Other seaweeds naturally have about 150 mg per serving (10 grams). And those packages at the grocery store have about two servings. However, in the United States, it looks like most of those roasted seaweed snacks are made from nori so they are low sodium. However, most of those packages of seaweeds often have salt added to them. All I can advise you to do is

to take time to read their nutrition labels for their sodium content and when you eat sushi rolls just be careful with the soy sauce.)

We even have a Korean study showing the potassium in foods like kimchi (pickled vegetables) tends to have a protective effect from the high sodium content.[145] But even then the study still found that those who ate *more* kimchi were *more* likely to have higher blood pressure. So it really wasn't that protective after all, and I can't recommend it as a health food.

And this is backed up by another Korean study showing that the young Korean men in their 20s are suffering more and more from hypertension as their diet is shifting away from Korean foods to more processed and Western foods that have sodium but little to no potassium.[146]

And don't forget about the prospective cohort study we talked about that looked at groups of various levels of potassium and sodium intake. It was the group with the *highest* potassium and *lowest* sodium that did the best when it came to death from cardiovascular disease (CVD).

So the potassium helps, but it still can't *negate* a high-sodium diet.

Well, I found this study of 101,945 people from five different continents (not just Asia) showing more salt consumption meant less mortality (including heart disease).[147]

Okay, let's look at that study. It was an observational study (as it always seems to be the case) that followed 101,945 people in 17 countries. The data suggested it is best to get between 3 to 6 grams of sodium (7.5 to 15 grams of salt), which is well above the *maximum* of 1.5 grams or 2.4 grams of sodium recommended by many health associations.

They based this off what they called a J-shaped curve in the data set. To understand what they are talking about let's understand the more common U-shaped curve. If you plotted a graph showing nutrient consumption and mortality (the y-axis/vertical line having more morality as you go up it and the x-axis/horizontal line being more of the nutrient

you consume as you go to the right), you usually expect a U-shaped curve. In other words, at deficient levels you expect a population's mortality to increase and at toxic levels you also expect mortality levels to increase. But at recommended levels, you expect to have the least amount of deaths. So you should end up with a U-shaped curve when plotting the data set. In this study, however, they found a J-shaped curve (really a backward J) in regard to sodium. In other words, you saw high mortality for people consuming the least sodium and barely any mortality for those getting too much.

Based off all the other observational studies, experimental studies, and how we understand the molecular science, we would expect to see the *exact* opposite. That is, fewer deaths with lower sodium consumption (except for unnatural levels at or near zero milligrams) and more mortality the more salt consumed (a J-shaped curve but in the other/normal direction). Something isn't right here.

That study was one of three observational studies regarding sodium consumption published by The New England Journal of Medicine on August 14, 2014.[148],[149]

Let's first see what the other observational studies had to say before we get into yours.

The first study used pretty much the same data set as the one you mentioned (102,216 adults from 18 different countries) and it showed that people getting less than 3 grams of sodium a day had the lowest blood pressure (both diastolic and systolic). And for every country, there was a trend that the more sodium you added the higher the blood pressure. And the less sodium you consumed, the lower the blood pressure. (There was a small uptick in blood pressure for the Chinese population in the lowest sodium consumption group of under 3 grams, but, overall, they followed the same trend. Remember this fact for later.)

The second study looked at 66 countries using mostly urine collections as a way to measure sodium intake (just like your study did) and it

determined that 1.65 million cardiovascular deaths a year were attributed to having more than 2 grams of sodium a day.

These large observational studies seem to be in direct contradiction to yours.

So what's the big takeaway here? They're observational studies, so we don't expect them to agree with each other all the time. And so we don't base our health decisions off of them. That's why we rely on experimental studies.

But let's see if we can explain away those findings in your observational study anyway.

So let's look at that third study, your study. If you look closer at the data, they break it up into five sections by sodium consumption with the lowest being the less than 3 grams of sodium a day group. That is where the J-curve starts to take off into mortality. To me, they should have broken that part of the data down into smaller groups as it contains the anomaly. But we'll work with what we've got. Looking at all the other numbers, they generally had the worst of them all. They had the highest cholesterol levels, the highest percentage of cardiovascular disease, the most calories, highest use of alcohol, and the highest use of medication, especially in regard to treating heart disease. (And these bad numbers decreased, especially regarding cholesterol and medication for heart problems, with the higher sodium consuming groups.) So one explanation that pops into my head right away is the "sick" population argument. They are already sick with atherosclerosis plaque (which can take years to treat) and they are dying before they can get better. Keep in mind that with the J-shaped curve, they were looking at *all* major cardiovascular events and cardiovascular deaths (as well as *all*-cause mortality which also had the same J-shaped curve). And, as we've discussed in this book time and time again, coronary heart disease is our number one cause of death, which is *only* caused by atherosclerosis plaque (and, no, you do not need a blood clot to block a coronary artery, it can be entirely from plaque, but high blood pressure isn't the only cause of blood clots either), and our second most common killer is stroke, which 85% of is also caused by

atherosclerosis plaque. While high blood pressure certainly doesn't help, the main cause of all of this is plaque which is what this population appears to be "sick" with. (And this would also explain why the higher sodium groups seemed to die less, because, looking at the numbers, they clearly had less atherosclerosis plaque to kill them.)

Furthermore, looking at the data, the largest groups come from China (they make up about half the study). Their top killers are also coronary heart disease and stroke (but stroke comes first for China.) And China has been in the news lately about having a sharp increase in heart disease since the late 1970s. Why? Because that is when the Western diet came in. There was a shift from plant foods to animal products and processed foods. (Remember, heart disease used to be virtually nonexistent in China.) So many of these Chinese doctors started/are recommending to their patients with heart disease (as they are also following the Western world's protocol of treating it) to change to a low-salt diet, but often don't also recommend (as they should) to stop eating animal products and processed foods. So these high-risk patients end up lowering their salt consumption significantly (as they don't want to die) but still eat red meat, processed foods, saturated fat, trans fat, and cholesterol, which keeps adding to the plaque in their arteries and they eventually end up dying of a heart attack. And that would easily explain this bizarre J-shaped curve in the data set.

Again, this is an observational study. Thus, they can get to only *potential* factors, not cause and effect. While they admit to this limitation of observational studies, they claim that their "array-approach analysis" (which is supposed to account for things like high cholesterol) makes it unlikely for their findings to be false. However, it's just a mathematical model they apply to the data set which is done for *all* observational studies. It was just a multivariate adjustment. Think about it, if everyone in your low-sodium group is sick with atherosclerosis plaque and they keep adding to it by eating animal products, it's only a matter of time before they die of heart disease. So it doesn't matter how much you adjust the numbers for that, it's going to look like a low-sodium diet equals heart disease. As I keep saying, you can only get to *potential* factors with these kinds of studies.

Another possible explanation has to do with, again, the potassium. Looking at the numbers, the group with the lowest sodium consumption had the lowest potassium consumption as well. And you need potassium to regulate and relax your heart muscles. But, as I've already said, you also need potassium to excrete (pee out) excess sodium. Your study looked at urine measures of sodium. (The theory goes that the sodium in your body is more or less at your desired amount and your body will get rid of what you consume. Thus, what is in your pee in a 24-hour period is a good indication of how much sodium you normally get in a day.) But if you aren't getting enough potassium, you aren't going to pee out that sodium, your body is going to retain it. And since that same group claimed to be eating the most fruits and vegetables (and since fruits and vegetables have on average more potassium than animal products), it might be an indication of kidney failure in this group. (As I will talk about later, saturated fat is one of the main causes of kidney failure. Stop eating animal products.) And studies have shown urine samples to be inaccurate with those who have kidney disease.[150]

(For those who want to investigate this further, I'll give you some more info. That study did not use actual 24-hour urine collections to determine the daily sodium and potassium intake of the participants. Instead, they applied what is called the Kawasaki formula to a morning fasting urine sample to project a 24-hour number. Which is fine as this method has been shown to be accurate. However, as the study I cited demonstrates, this isn't the case with those suffering from chronic kidney disease.)

Plus, in China, like Korean, a lot of their vegetables (their sources of potassium) have a lot of sodium in them (like stir-fried vegetables and different vegetable soups). So when the doctor says to stop eating sodium (or even oil/fat because a lot of their vegetable dishes have a lot of oil in them), they might lose what little potassium (and other health benefits from those vegetables) they were getting in their diets.

Now think back to the other observational study I mentioned that used pretty much the same data set as yours with that slight uptick in blood pressure for the Chinese low-sodium group. Unnatural sodium

retention, kidney disease, suddenly treating their high blood pressure with a low sodium diet, not getting enough potassium, and/or bad urine sample measurements could explain this and it would be consistent with the explanations I've been giving for the unusual findings in your observational study. It all matches up.

And I believe those are pretty reasonable explanations as to why we have this *one* large-scale observational study that is so different compared to all the other large-scale observational studies out there.

But, again, we don't really care about the *observational* studies. All we really care about are the *experimental* studies. And those done on all animals and humans consistently show sodium and salt to increase your blood pressure. Our understanding of the molecular science also backs this up.

But do we have experimental studies showing a link between sodium consumption and cardiovascular death? Actually, yes, we do.

Morality - Experimental Studies

So in experimental studies, we have to control the groups and the variables. While this is easy for linking sodium intake and blood pressure as the change is pretty quick, showing a link between sodium consumption and death is harder as that's something that happens over a lifetime.

Then how are these experimental studies done?

Most of them involve the elderly in retirement homes since we can easily control their sodium intake and access to salt before they die. A little morbid, I know. This one had the elderly people in retirements homes replace their table salt with a potassium salt (potassium chloride). The results? A reduction in cardiovascular death and a longer life (and they even saved on medical costs).[151] Like I said, if you're going to use a soft water system at home, use those potassium salts. And if you really love putting table salt on your food, you can use potassium chloride instead.

And there are other interventional studies with younger adults (though these experimental studies can't be as tightly controlled as the ones used in retirement homes so they're a little more observational in nature). They also show the same link.

This one (thousands of 30- to 50-year-olds, followed for 15 years) didn't even bother having them increase their potassium. They only targeted sodium reduction (one of their groups also added in weight-loss). And they found the same results: more sodium means more cardiovascular death and more cardiovascular disease. By reducing sodium intake by 25%-35%, there was a 38% decrease in CVD mortality. Also, unlike your study, they made sure these people were free of cardiovascular disease and hypertension before starting it. And, unlike your study, it used actual 24-hour urine collections for sodium intake.[152]

Another follow-up study was done with the same group 5 years later (so 20 years in total) using the same 24-hour urine collection method this time looking at all-cause mortality. They saw a "direct linear association between average sodium intake and mortality." So a straight line instead of a J-shaped curve. The lowest total mortality group was those with *less than* 1 gram of daily sodium intake (way less than the 3 grams to 6 grams suggested by your study) and there was a steady increase in deaths as you consumed more sodium per day (about 12% increase in total mortality for every gram (1,000 milligrams) increase of sodium).[153]

And that's not to mention all the observational studies we've already talked about linking sodium consumption and death (which included prospective cohort studies and a countrywide study done over 30 years).

I think the science is pretty overwhelming at this point. Salt will kill you!

And just common sense would tell you high blood pressure is bad for us. Pipes under pressure will start to leak, deform, or even burst. You don't want that for your heart.

What Should You Do About Salt?

So *all* the studies out there show a link between sodium consumption, high blood pressure, and heart disease with very few exceptions. But those exceptions are observational studies which we can give explanations for.

Either the groups they studied weren't getting enough potassium, which will cause you to retain sodium, regardless of levels consumed, and you'll then suffer from more hypertension and heart disease; or they are trying to link sodium consumption to heart diseases that *only* atherosclerosis plaque can cause. I think it's a pretty clear case of another industry trying to use misleading observational studies to confuse the public.

And the experimental studies consistently showed the link between sodium consumption, blood pressure, and mortality.

There is no debate. Salt is bad for you.

But what should you do about salt in our modern society? How much should you worry about it?

Remember the Bantu people in Africa who eat mostly fruits and vegetables? Hypertension (high blood pressure) is uncommon with them. But that means the Bantu people do have *some* hypertension (1 in 10 adults) unlike the Yanomami Indians in Brazil who have *no* hypertension. This is probably because the Bantu have been exposed to the Western diet and processed/salty foods to a degree while the Yanomami have little to no contact with the modern world.[154]

That means a vegan diet is good, but a vegan diet without salt is even better for you.

But I know you probably don't want to spend your life counting your milligrams of sodium. Then I would suggest you eat more potassium (like I said, it makes your body pee out excess sodium and it relaxes your arteries). And where do you find great sources of potassium? You

guessed it, plant foods. Just another reason to eat your fruits and vegetables.

Just think back to the observational study showing a decrease in sodium *or* increase in potassium decreased deaths in a population. But the group with the lowest sodium consumption *and* highest potassium consumption had the best heart health. But even that study might suffer from the "sick" population problem (keep in mind, 1 out of 3 adults over 18 have hypertension, and 1 out of 2 senior citizens have hypertension), as the lower sodium groups were probably nowhere close to the Yanomami Indian levels.

Again, I know you don't want to stress about counting your milligrams of sodium. But, I think it's still possible to add low amounts of salt to our diet without *any* risk of hypertension. Let's look at another indigenous tribe who naturally consumes sodium.

The Kitava from Papua New Guinea cook their food in seawater (so they get salt, specifically sodium chloride, what's in our salt shakers, in their diet but much less than the average American). However, they also eat a ton of potassium-rich foods (they get about three times what the average American does). Yet, unlike the Bantu, they have *no* signs of high blood pressure. And, like the Yanomami Indians, their blood pressure stays pretty much the same their whole lives (I'll talk more about it for those interested). And keep in mind, they don't eat a perfect vegan diet. Some smoke tobacco and they all eat some saturated fats (like the occasional coconut and fish, but they eat mostly yams and sweet potatoes). So eat fruits and vegetables that are high in potassium! The more the better.[155]

(For those who want to know more about their blood pressure, their diastolic (resting blood pressure) stayed the same for their entire lives. Their systolic (beating blood pressure) had a small uptick but only in their 60s and only by 10 mmHg which still left them in what our society considers the normal range. But that's a small price to pay considering you get the luxury of eating some salt in your diet and it'll probably never cause you to die of cardiovascular disease. Heck, most Yanomami Indians don't even live to 60.)[156]

(And for those who want to know more about their saturated fat consumption, they eat fish about 2-4 times a week. Given that they do have "partly unfavourable serum lipoprotein [cholesterol] levels" and that fish is pretty low in saturated fat, they believed it was due to their daily intake of coconut. Basically, it doesn't matter where you get your saturated fat, it should be avoided as much as possible. To be fair, about 80% of the Kitava smoke. However, smoking affects HDL more so than LDL, and LDL is what was high for them. And the study even looked at smokers versus nonsmokers in regards to LDL. All males, smokers and nonsmokers, met the Mayo Clinic's definition of high but near optimum levels, 100-129 mg/dL. All females, smokers and nonsmokers were high for heart disease, 130-159 mg/dL. The difference was probably due to the males being more physically active. (And this is probably why people who go Paleo can often post improved cholesterol and blood sugar levels despite the increase in saturated fat as they sharply increase their physical activity as well. So if you end up eating fatty foods or animal products on the holidays, do some push-ups, squats, sit-ups, and walk around the neighborhood or the mall with the family. But like the Masai, the Paleo community is probably still adding layers of atherosclerosis plaque to their arteries which can lead to a heart attack just like the guy who started the jogging craze in America. Stick to plant foods.) Don't forget the "sick" population argument and the fact that heart attacks are the number one killer in the Western world. These numbers are probably way too high if you want to avoid heart attacks altogether. While there were no heart attacks, ischaemic heart disease, found among the Kitava, they are active all day long, like the Masai. And since you are probably at school or work sitting at a desk all day, your best bet is to avoid all saturated fats in your diet. Your body can make its own.)

If you're wondering which plants have a lot of potassium, it's mostly the starchy kind like potatoes, sweet potatoes, winter squash, and acorn squash. And guess what the Kitava eat? Starchy tubers like yams, sweet potatoes, taros, and cassavas. So if you really want to avoid hypertension, start adding starchy foods to your daily diet. But keep in mind, other whole foods like spinach, broccoli, kale, lentils, pinto beans, black beans, and bananas are pretty comparable. So just make

sure you eat a *variety* of fruits and vegetables, avoid the salt shaker as much as possible, avoid processed foods, and you should be just fine. But keep in mind, the Kitava are also out in the sun (which helps to dilates your arteries/lowers your blood pressure) and are active. So get out in good weather whenever you can.

If you do add salt, do it very sparingly. You can still add a little salt to a whole foods diet *if* you prepare *all* your meals from scratch and still be below the American Heart Association recommendation of no more than 1,500 mg of sodium a day. A fourth of a teaspoon of salt a day is about 500 mg of sodium and half a teaspoon is 1,000 mg of sodium. But keep in mind if you season your food with salsa, hot sauce, ketchup, or other pre-made condiments, they tend to already have a good amount of sodium in them. So make sure to read your nutrition labels. Even plant milks tend to have some sodium in them. Unsalted vegetable broth also has a good amount of sodium in it as well (vegetables, while low in sodium, tend to have the highest natural levels of all the plant foods). Personally, I pretty much never add table salt to my food.

In short, if you do get table salt in your diet, then add some potatoes (or other starchy tubers) to your diet. And try to get some fresh air, sunshine, and exercise while you're at it.

(Since *white* potatoes are low in antioxidants for a plant food (remember, darker colors in plants generally means more antioxidants), I try to eat them with other plant foods high in antioxidants like hibiscus tea, spinach, beans, lentils, turmeric, tomatoes, etc. I think even ketchup and mustard have a decent amount of antioxidants in them as they contain tomatoes and turmeric, respectively. This way I don't have to worry about an inflammatory response in my body from a lack of antioxidants in my potatoes.)

Kidneys and Perspiration

And don't worry too much about getting enough sodium as healthy kidneys are good at retaining the sodium you need. But if you're

wondering about how much you sweat out, exercise for half an hour and you'll lose between 100 mg to 500 mg depending on how much sweat you produce (which is about the amount you'll find in a sports drink) so you can adjust accordingly. (However, if you're outside on a very hot day while playing a sport, you can lose up to 1,000 mg every half hour. I'll talk more about handling this situation later.) So losing too much sodium can happen to marathon runners, but if you restore your sodium during or after each workout (but you also need other electrolytes which we'll also talk about later), you won't have to worry about getting enough during each meal as I said healthy kidneys will keep sodium in. A good-sized, healthy salad full of a variety of vegetables (without dressing or salted nuts) will probably get you 100-200 mg. And that's probably enough in a day unless you sweat. There are no recommended minimum levels of sodium as no one is found deficient unless you do marathons or have a disease that will cause you to pee it out. Think about it, if our kidneys weren't able to retain sodium at their proper levels, then everyone who did a 30-day water fast should be dead at the end like those marathon runners who drink too much water. But they do it without any heart problems except for a very few who probably had kidney disease. And if you're worried about kidney disease, the top causes are adult onset diabetes (the type that has to do with insulin sensitivity, which we know now is caused by saturated fat—avoid animal products) and high blood pressure itself (avoid the sodium). But besides animal fat, animal protein seems to produce toxins that overwork, put pressure on, and, ultimately, damage your kidneys.[157] So it's no wonder that people on a plant-based diet tend to have healthier kidneys.[158] The good news is a plant-based diet can also be used to treat kidney disease.[159]

Iodine

And if you're going to use salt, you might as well use iodized salt. Iodine is an element and a micronutrient (so you only need a little bit and too much is bad for you, but it's still an essential nutrient). This is why it's often called a trace element or a trace mineral. However, if you're eating processed foods, you're probably getting way too much

salt and you shouldn't be adding any salt, including iodized salt, to your foods. But if you're now worried about getting enough iodine you should read what I have to say before supplementing.

(There's going to be a lot more analysis. Unlike sodium, we don't know exactly how much iodine is in our food. So I ended up doing a lot more number crunching here. In short, you should have nothing to worry about as long as you eat a *variety* of fruits and vegetables. The only exception might be athletes and pregnant and breastfeeding women. But if you're in one of those groups and just want to know how to play it safe, look at the Supplement Guide in the back of the book.)

Many will claim a vegan diet will cause a goiter (swelling of the thyroid gland, a gland in your throat/voice box, so it can absorb more iodine from the blood) because that diet doesn't supply enough iodine. However, a vegan diet seems protective against hypothyroidism (underactive thyroid disease from too little iodine that often goes with 90 percent of goiter cases).[160] Compared to meat-eaters and different types of vegetarians, vegans were the least likely to develop the disease. Meat-eaters and lacto-ovo-vegetarians (vegetarians who consume dairy) had the highest rates. And the study pointed out that *obesity* has the strongest link to hypothyroidism (even just being overweight had a stronger link than diet). Plus, another study on rats showed that a diet high in saturated fat deformed the thyroid, disrupted thyroid hormones, and of course, they gained weight.[161] And another study on mice showed that a high-fat diet and excess iodine work together to damage the thyroid.[162] Sure, we would prefer human studies, but I think they link the other studies together pretty well. Remember, milk, cheese, and butter tend to have the most saturated fat compared to other animal products. Milk and dairy products also tend to be high in iodine because of the disinfectants given to cows. That's probably why those lacto-ovo-vegetarians had the highest rates of thyroid problems in the study. And since vegans tend to be slimmer, don't drink milk or eat dairy products, and eat less saturated fat in general, that might explain why they had the lowest rates of thyroid disease amongst all the groups in the study.

The History and Molecular Science

But back to goiters specifically. To better understand what is going on with goiters, let's look at its history in America and the molecular science. Two-thirds of your body's iodine is in your thyroid, it needs it to produce key hormones. When it doesn't get enough, it'll tend to enlarge to capture more iodine from the body. (Don't let people scare you from eating plant foods because of goitrogenic compounds, compounds that block iodine absorption. The levels are extremely small in the few plant foods that have them and they've been shown to not have any effect on the thyroid.[163],[164],[165] Plus, several, like isothiocyanates, have been found to be antioxidants and anticancer, especially for thyroid cancer.[166] Only soy seems to have a moderate amount of its own goitrogenic compounds, but the experimental studies show no real interference with thyroid function.[167],[168] The bottom line is if you have a goiter, it’s because you're not getting enough iodine.)

Before salt was iodized, goiters were commonly found in places far from the sea with a lot of rivers and lakes, like North America's Midwest (especially close to the Great Lakes), and places that block rainwater from the sea, like North America's Intermountain regions.[169] This is because oceans are the world's main source of iodine and very little is found in the soil. The reason soil isn't rich in iodine is the same reason the Great Lakes (and lakes in general) aren't salty like the sea: rivers and rainwater pull minerals (iodine and sodium are minerals) out to the ocean. (Whether rainwater, even that from the sea, adds or takes away minerals all depends on if it is able to drain to the ocean or not. If a valley is designed right, it can retain a lot of the minerals brought from the ocean. And this is one of the reasons why California's Central Valley, even though being close to the sea, has the world’s largest patch of top-tier soil and why it is used to produce half of the nation's fruits and vegetables. This is also why some parts of this same valley have very high concentrations of salt. The other way to get iodine and other minerals, and where oceans got their iodine originally, is through volcanic activity. And that is why Yellowstone National Park is so flush and full of life even though it has several mountain ranges to the west blocking seawater rains.) To treat the high rates of goiters in places

with low iodine rates in the soil, companies started to iodize their salt in the 1920s. And now goiters are virtually nonexistent in America. So many argue all salt should be iodized.

Hyper and Hypothyroidism

However, since our oceans have so much iodine, eating a little bit of seaweed can provide so much you won't need to eat more for a long time (enough for weeks or even months). Keep in mind too much iodine can induce not only hyperthyroidism (overactive thyroid from too much iodine) but also the hypothyroidism that we talked about earlier. And it seems like supplements can cause subclinical hypothyroidism even when *total* iodine intake is under most nations' maximum recommendations of 1,000 mcg. (That is 1,000 *micro*grams, not milligrams. And that amount is equal to 1 milligram. Like I said, it is a *trace* mineral.) And subclinical hypothyroidism was almost at a 50% rate for those getting a 2,000 mcg supplement.[170] Yet, the Japanese who get a lot of iodine from seaweed (1,000-3,000 mcg) had very low rates of subclinical hypothyroidism (<6%).[171],[172] Even then, it appears those with subclinical hypothyroidism had "disturbed lipid metabolism" which usually means elevated LDL levels, which might be a sign of too much saturated fat in the diet. And we know by now how much saturated fat can hurt the thyroid. But before you binge on seaweed, they still had pretty high thyroid abnormalities in general (1 in 10) for those 40 and older (Americans have about the same rate for those 60 and older) and see what I have to say about cancer next.

Cancer

Let's now look at cancer and iodine. Too much iodine seems to have a link to thyroid cancer. This has been found in several countries when they started to supplement their iodine in their salt.[173],[174] This isn't too surprising as iodine is used as a disinfectant because it is a pro-oxidant (the same iodine they used to treat goiters was used to disinfect). So just as we see iron oxidation causing rectal cancer, it isn't surprising that iodine might be causing thyroid cancer. However, just

as beans have phytates to protect themselves from iron and thus us when we eat it, plants high in iodine probably have some type of phytochemical(s) to protect themselves from iodine and thus us when we eat it. So it's probably best to get your iodine through whole foods and not through a supplement. But even then, there might be a weak link between high iodine levels from seaweed and thyroid cancer.[175] That Japanese study showed the people who ate seaweed daily were 70 percent more likely to develop cancer than those who ate it twice a week or less, postmenopausal women were four times more likely. However, another study in the same journal four years later showed *no* increase in cancer rates for those same groupings, including postmenopausal women (at least nothing statistically significant).[176] Both were prospective observational studies of similar size and length, so it's hard to draw a solid conclusion. (In an attempt to explain the differences between the studies, keep in mind, Japanese markets tend to have a wider range of seaweeds to buy and some of those exotic seaweeds have a year's worth of iodine in a serving. Plus, like some exotic teas, these exotic types might have chemicals in them that are toxic to humans. So when you eat your vegetables from the sea, like your tea, stick to the popular, normal stuff.)

But looking at all the studies in their totality, it seems it's better to get your iodine through whole foods, like seaweed. And not getting enough iodine can lead to mental deficiency, deafness, stunted growth, thyroid cancer as well, and even death. (So don't feel too bad about binging on that seaweed.) Furthermore, thyroid cancer seems to have a stronger association with obesity than anything else.[177] And, like I already mentioned, obesity is also the strongest factor in the thyroid disease hypothyroidism. These correlations might be explained by too much dietary saturated fat not only damaging the thyroid but also adding weight to your body through insulin resistance. And a vegan diet can help prevent all of that.

Counterargument

But increasing your levels of iodine through iodized salt have been shown to increase IQ.

Before I answer you, let's back up and understand the science. The reason your thyroid has high levels of iodine is for hormone production. Those hormones are believed to play a role in brain development. As such, pregnant women, nursing women, and infants need to have adequate iodine levels (with nursing women probably needing the most).

But that increase in IQ was only in the 1920s when goiters were prevalent. And those lower IQ rates were only found in places where the soil was low in iodine. So it isn't specifically iodized salt but iodine itself. (Again, why not get your nutrition/iodine through whole foods?) Keep in mind, it was in the 1950s when the national highways were built in America so we are no longer bound by the vegetables grown in our local soil. We can even buy seaweed at our local markets for goodness' sake. And in soils where iodine is low, most developed countries that grow crops there now fertilize with iodine. Even a lot of less developed countries are now fertilizing their soils that are low in iodine with iodine-containing water. And, yes, they are seeing an improvement with IQ.[178],[179]

So, like I said, is it very important for pregnant women, nursing women, and infants to get enough iodine. But that's why they should be getting regular checkups and blood tests from their doctors. Chances are if you're low they'll just give you a prenatal vitamin and you'll be covered. (While it is preferable to get your iodine through whole foods, the one exception I would make is for lactating women as iodine is constantly being lost through breastmilk. And as low iodine has a link to both breast cancer and fibrocystic breast disease and when you consider its importance to your baby's brain development, you're probably better off using a prenatal vitamin while breastfeeding. But make sure your prenatal vitamin actually has iodine in it as half of prenatal vitamins checked didn't have iodine.[180] So you need to read the labels. Interestingly, the study showed some of the prenatal vitamins used kelp (seaweed) instead of potassium iodide. While all the kelp versions did contained iodine, they varied from 33 to 610 mcg per daily dose.)

(If you’re pregnant but want to go a more natural path, you could eat nori sheets. Those roasted seaweed packages found in the United

States are often nori. Unfortunately, they often don't list the type of seaweed on the package, but if salt is listed in the ingredients and the Nutrition Facts label still gives a low sodium count, it should be nori as nori itself has virtually no sodium in it while other seaweeds have quite a bit. Based off of various websites I see, they list nori on the low end compared to other seaweeds of having 12-18 mcg of iodine per gram. With about 10 grams a serving, one serving of roasted seaweed will give you roughly the extra 150 mcg you are looking for as a pregnant woman. But as I'll slow later, even as a pregnant woman, you might still be getting plenty of iodine through whole foods.)

Remember the study showing a low-sodium diet increased intelligence? Considering most table salt is iodized, don't you think the results would have been screwed up if iodine was that important later in life for human intelligence? If you want to be smarter, you're most likely better off with less salt.

Of course, this is probably making you wonder if you are getting enough iodine from your foods. We'll be answering that next.

Am I Getting Enough Iodine?

Finally, there seems to be a lot of misinformation on iodine in regards to how much different foods contain and how much we need. The standard recommendation for adults in the U.S. is 150 mcg per day. Children should get about 90-120 mcg depending on their age. Breastfeeding and pregnant women have higher requirements of 290 mcg and 220 mcg, respectively. (I think governments overstate their guidelines for toddlers, 130 mcg, because iodine is so important to brain development, so they would rather have you get too much at this stage than not enough.) If you're worried about getting enough iodine during breastfeeding, like I said you can take a prenatal vitamin which most contain about 150 mcg of iodine. Again, read the labels as half of prenatal supplements don't contain iodine. More is probably safer than not enough. And if you get the occasional high levels of iodine, especially through a whole food like seaweed, I imagine you'll be fine if not better off.

Keep in mind, our bodies adapted to having various levels of iodine intake. You normally have about 15,000-20,000 mcg in your body with most of it, about 10,000-16,000 mcg, in the thyroid. But, unlike sodium and other electrolytes in your body, your kidneys can't hold on to it (as far as I can tell from reading the medical literature, that's probably why we lose about 90 percent of what we eat daily through our urine[181], or about 100-200 mcg, and thus the 150 mcg daily recommendation). While your kidneys can't hold on to iodine, your thyroid can. Your thyroid has a 100-day half-life with iodine. So if your thyroid got 1,000 mcg from your diet in one day, 100 days later it would still have 500 mcg of it. Your other organs can also hold on to iodine for weeks to months at a time. But iodine is mostly used for your thyroid (though your body needs the hormones the thyroid produces with iodine). It seems to play some minor roles in other tissues, but what it does exactly is unknown. While your kidneys may not have a mechanism to retain iodine when needed, your kidneys are very good at getting rid of *excess* iodine, at least if it's from a whole food like seaweed. Several Japanese studies show up to 97% urine excretion of daily consumed iodine of up to 30,000 mcg/L.[182] And after that, it goes back to the standard 100-200 mcg. And, as I'll prove later, getting that 150 mcg of iodine through whole foods in a developed country isn't hard at all. But, like sodium, iodine is lost through your sweat. So athletes who sweat a lot will need to take measures to make sure they're getting enough iodine. Again, I think it's best to just restore your electrolytes and iodine levels right after a workout so you don't have to worry about adjusting your intake levels during meals. But when it comes to sodium and iodine, this is the only place where you might get into trouble, so I'm going to take a good portion of the book here to talk about what you can do. I'll talk about getting iodine through whole foods after that.

Restoring sodium and iodine after a workout

(If the math here makes your head spin—and I don’t blame you—just look at the Supplement Guide at the back of the book.)

Sports drinks, like Gatorade, tend not to contain iodine. Well, you can always make your own sports drink. While I said to stay away from fruit

drinks, the one exception is probably right after or during a workout when your body can use the sugar. Based on the different numbers I see in studies, I would guess about 3-15 mcg of iodine is lost in your average 30-minute workout (and like I said before, that'll also be about 100-500 mg of sodium lost). You can add an eighth of a teaspoon of iodized salt to get your 250 mg of sodium and 30 mcg of iodine. (Iodized salt in America is supposed to contain 45-75 mg of iodine per kilogram (kg) of salt. But a study showed more than half tested fell below that.[183] So we'll take the lowest number of the range, that's about 45 mcg of iodine per gram (g) of salt. There are 5 grams per teaspoon of salt, so 225 mcg of iodine. Divide by 8 and you get about 30 mcg of iodine.) Or if you want to avoid using table salt, you can use something like strawberries and celery. Strawberries tend to pick up and hold more iodine than any other plant. After biofortification, they can hold 60-400 mcg/100g.[184] A cup of whole strawberries is quite a bit more than 100 grams. So I'm pretty confident that'll get you at least 15 mcg even if it isn't biofortified. Add about 3 cups of chopped celery to your strawberries and you'll get about 250 mg of sodium. Of course, you can add an apple or orange for taste (just so you know, like most fruits, they have pretty much no sodium in them).

Or you can avoid the sugar altogether and juice vegetables. Remember, leafy greens and vegetables, in general, tend to have a lot of iodine, sodium, and potassium in them. Beets, spinach, and celery should give you a nice amount of those minerals. (Don't forget beets have been shown to improve athletic performance.) And when you add regular tap water, that's going to be adding your calcium and magnesium ions. As I'll prove later, you lose very little calcium and magnesium through sweat so the amount in your tap water should be fine.

So that should cover most people who workout at a gym. (And you probably noticed while looking at the numbers that most people won't even need a DIY sports drink, especially if you don't break a sweat, that they can easily get what they need through eating whole foods. I'll be talking more about that later.)

However, if you're outside on a hot day playing an intense sport like soccer, you can lose up to 2,000 mg of sodium and about 50 mcg of iodine an hour.[185] Almost half of the athletes in that study had a mild goiter.

(For those interested in how I've been getting my numbers and whether you need to worry about other electrolytes, I'll talk about it here. Per the study above, we lose about 37 mcg of iodine per liter of sweat. Since you lose about 0.8 liters of sweat during indoor recreational sports/working out per hour, that's about 30 mcg iodine lost per hour or 15 mcg per half an hour. But a lot of people barely break a sweat in an air-conditioned gym so I started at a fifth of that. That's where I got the number above. They also said there is about 1270 mg of sodium per liter of sweat. That times 0.8 liters gives about 1,000 mg. And that's how I got about 500 mg per half an hour workout. Again, considering that most people in an air-conditioned gym barely break a sweat, I gave the range of 100-500 mg sodium lost during a workout. Potassium and calcium lost was minimal. They didn't look at magnesium or chloride nor could I find other studies covering it. But I we can calculate that as the amount of electrolytes lost seem to be in the same ratios as they are found in your blood, as your sweat glands don't appear to regulate your electrolytes lost through sweat. It involves converting meq/L (milliNormal per Liter) to mg/L and then multiplying that by the 5 liters of blood in the body. Potassium and calcium is about less than 1,000 mg each in your blood (which is consistent with the amounts found in our sweat per the study). Magnesium is about 150 mg. So the amount sweated out is probably undetectable and is probably why they didn't talk about it in the study. We've already covered chloride being almost equal to sodium in our blood, 18,000 milligrams. As such we can assume we lose about the same amount in our sweat. But I wanted to make sure. Luckily, they use chloride levels in sweat to test for cystic fibrosis. They say 39 mmol/L or less means no cystic fibrosis. So we'll take the worse case but still healthy scenario of 39 mmol/L, which converts to 1,380 mg/L. So about the same rate as sodium and about the same ratio of chloride to sodium in our blood. Remember, milligrams is mass so we have 40% more sodium atoms in our blood and sweat than chloride atoms. So if table salt (sodium

chloride, a one to one ratio by atoms and about a 4 to 6 ratio by mass, respectively) is getting you enough sodium, it's certainly getting you enough chloride atoms. If you're now worried about getting enough chloride without table salt, foods that are naturally high in sodium (spinach, celery, seaweed, etc.) are also naturally high in chloride in roughly the same amount. And your kidneys retain chloride just like sodium. So, also like sodium, there is no recommended minimum. But the point I'm trying to make is that athletes should be fine using table salt since it'll get them plenty of chloride as well.)

So here's what you can do. Add a fourth a teaspoon of iodized salt to get 500 mg of sodium and 60 mcg of iodine and three-fourths of kosher or sea salt (pure salt) to get the remaining 1,500 mg of sodium and split that between two 16-ounce water bottles (32 ounces altogether or 4 cups). Throw in some juiced fruits or vegetables for taste, sugar, antioxidants, and other trace minerals. You will need something to mask the salty taste. If you add a lemon, a lime, and 4 cubes of sugars (60 calories) to a 16-ounce bottle, it tastes surprisingly like Gatorade. Hibiscus tea will probably be another good thing to use as it has a lot of antioxidants, lowers your blood pressure, and has a fruity taste to it. Now you're making your own natural and probably healthier versions of lemon-lime and fruit punch Gatorade. Then drink one of those after or during (but only *after* you've started to sweat a lot) every hour you play a sport out in the hot sun. Everything else you drink should be just water. Now your student athlete and marathon runner has a sports drink based on the science. Just make sure they're getting enough potassium in their diet so their body can filter the excess sodium if they're not sweating enough. Those athletes sweating heavily outside were losing about 250 mg of potassium an hour. (So when you apply the math nothing to really worry about for everyone else working out inside. But if you're an athlete and you're remembering the 1,000 mg in our blood and scared by that 250 mg number, 98 percent of your potassium isn't in your blood but in your cells and your body can pull it out as needed. Still, considering potassium's heart benefits and ability to help you pee out excess sodium, it wouldn't hurt to add some potassium to our sports drink.) For athletes who want to make sure that they're keeping their potassium levels topped off, add half a cup of

coconut water to our 32 ounce mixture (there is no saturated fat in coconut water). It'll give about 250 mg of sodium and about 600 mg of potassium a cup. So about half the sodium of our DIY sports drink per cup. Unfortunately, I can't find information about its iodine content, but being a plant food it probably has some.

For those interested in pink Himalayan salt, while I couldn't find a study on the mineral content, I found the following from what seemed like a somewhat reliable source online: chloride, 590 mg/g; sodium, 380 mg/g; sulfur, 12 mg/g; calcium, 4 mg/g; potassium, 3.5 mg/g; and magnesium 0.1 mg/g. There isn't enough potassium or magnesium to really help, but it's interesting that they're there nonetheless. However, the amount of calcium might be enough to make a difference as those athletes on a hot day were losing about 20 mg an hour and you'll get about 10 mg in half a teaspoon. But calcium is probably the least important mineral when it comes to sweat as bones are a huge reserve for this electrolyte. So you can always wait until you get it from food. A second source online gave the following measurements: chloride, 590 mg/g; sodium, 380 mg/g; sulfur, 1.7 mg/g; calcium, 1.4 mg/g; potassium, 3 mg/g; and magnesium, 20 mg/g. Here there is enough magnesium to make a difference, but not calcium. So mineral content seems to vary a good deal by brand. For iodine, the first source said less than 100 mcg/g for iodine so about twice the amount found in most iodized salt. (It said less than 0.1 grams which I assume they mean per kilogram as they state that for just about all the their other minerals. I worry this might not be accurate as they used a different measurement method for iodine and one other mineral which is also stated as less than 0.1 grams. This is why I prefer peer-reviewed scientific studies.) The second source gave about 1 mcg/g. Big difference. All the minerals after that, about 80, were in microscopic amounts. Unfortunately, we don't know what those minerals do to your body. But we do know most are present. Trace amounts of aluminum, bromine, rubidium, and vanadium are found throughout the body. Arsenic, gold, cobalt, chromium, indium, antimony, and titanium are also found in various amounts in human organs.[186] Just how iodine plays a mysterious role in tissue health, besides being used by the thyroid, these other trace minerals might be used by the body for

various things. Though you could probably argue we also get those minerals in various plant foods. For example, there is titanium in your plants. And trace amounts of it seem to really improve plant health.[187] As with iodine, plants tend to absorb whatever minerals happen to be in the soil. So your body probably evolved to handle a variety of minerals, even toxic ones. Though, as we'll see with iodine, what minerals get absorbed and held onto the most will vary with each plant. Thus, as always, eat a *variety* of fruits and vegetables, so you don't get too many toxic minerals (like mercury or arsenic) or not enough necessary trace minerals. The point I'm trying to make here is that you probably shouldn't be afraid of taking Himalayan salt because of the exotic trace minerals. But you shouldn't take Himalayan salt to get those exotic trace minerals either as you should get enough through common foods (both plant and animal). (I would still venture to say it's best to get your trace minerals through plants. Why? Because since plants are in the soil and can't move, I imagine they would have to evolve some type of mechanism to protect itself from toxic minerals in the soil by not absorbing them or by binding them to something.) Besides, the mineral content for Himalayan salt seems inconsistent going from one brand to another. But for your DIY sports drink, you're probably fine replacing a fourth of a teaspoon of your kosher or sea salt with Himalayan salt to make sure you get enough but not too much iodine.

(If you're wondering about how much of the non-electrolyte minerals, like iodine, we lose through sweat, it doesn't seem to be a concern. For zinc you lose about 5 percent of your Recommended Dietary Allowance (RDA, how much you should be eating each day) per hour of sweating. So that's about 0.5 mg. And I would guess for athletes out in the hot sun about 1 mg. For iron, you lose only about 1 percent of your RDA per hour.[188] It seems like only iodine is the exception to this pattern.)

While iodine is a problem for athletes, sodium loss still seems to be the main issue. That's probably why we hear about marathon runners dying and having heart problems from not having enough sodium and never really hearing about them having goiters. So you can see the

problem sweating too much in the hot sun can cause us. This is probably why we, like many animals, crave salt so much. Better alive with high blood pressure, even with a shorter life, than dead today with low blood pressure. But even better is alive today with low blood pressure and a long life. And thanks to modern society, we can do that. And this is probably why a lot of Paleo people who work out a lot swear animal products make them feel better. It's not that it's better, rather they are probably getting the sodium their bodies want, though unnaturally as animal flesh is naturally low in sodium. But if you don't sweat a lot, then you need to avoid daily excess levels of sodium and supplemental iodine unless you want thyroid cancer and dysfunction or cardiovascular death.

But what if you work out and don't want to make or drink a sports drink? What if you only want to eat whole foods? Well, if you just go to your local gym and work out for half an hour, a cup or two of beets will do you just fine. A cup of raw beets will give you about 100 mg of sodium, 130 mg for cooked. Being a dense vegetable it'll probably give you about 10 mcg of iodine per cup (more on how I got this number next). So for your average 30-minute workout that should be more than enough sodium, even if you do sweat a decent amount, by the time you include the sodium and iodine in all your other foods, especially if you're living in a developed country. And you're probably fine eating a sodium-rich whole food *before* you work out as it'll take time for your body to start absorbing it, unlike a juice. So you don't have to worry about your kidneys pulling it out of your blood before you can start sweating it out. Again, don't forget, beets have been shown to improve athletic performance (plus, beets dilate your arteries and thus lowers your blood pressure). You can't go wrong with a whole food diet. But if you don't have beets, celery and carrots together should be a good alternative for your sodium and iodine. So only athletes and marathon runners sweating a lot will have to worry about drinking a sodium and iodine rich sports drink. But that's enough about drinks. Let's talk about food.

Iodine in Our Food

So how much iodine is in our food? While many say potatoes are high in iodine, some studies show they are some of the lowest in certain regions.[189],[190],[191] They show as little as a few micrograms per kilogram. (For those who read the studies, 1 microgram = 1 mcg = 1 µg = 1 *γ* (gamma). Gamma is a symbol that has been deprecated but you'll see it in the older studies I cite. Most medical literature will show "µg" (µ stands for micron) for micrograms to prevent doctors from confusing it with milligrams and potentially giving a lethal dose of something.) The highest plant foods in these studies (besides seaweed) by weight were regular vegetables. So probably the greens or vegetables you would use in a salad have the most natural levels of iodine (same with sodium). And, again, a lot of it has to do with what soil everything is grown in (it ranges anyway from 10 mcg/kg to 1000 mcg/kg in soil dry weight). However, if the potatoes are *biofortified*, then, yes, you will probably get about half of the mcg recommended daily from a single meal.[192] But how do you know if your potatoes are biofortified? (Biofortified can mean a range of things, but in regard to iodine, at least with most of the research I've come across, it means they enrich the soil with iodine.)

But it's not as bad as I'm making it sound. Let's look at potatoes in America before biofortification and see if you could still get enough iodine. A study in the 1930s looking at potatoes in Minnesota (right next to the Great Lakes, so the eastern soil should be very low in iodine) found that potatoes from the western soil had more iodine and people had lower rates of goiters there compared to people living in the eastern soil.[193] The rate was about 2.5 times more iodine in the western potatoes (about 22 mcg/100g). That's a pretty high number. But the middle part of the United States is some of the most fertile (since the rainwater there can't easily drain to the ocean) which Minnesota is close to. So let's look at a state closer to the ocean. Another study done in the 1930s for Pennsylvania found about 7 mcg/100g on average, with the most being about 20 mcg/100g and the lowest being 1 mcg/100g.[194] (For those looking at the study, p.p.b., parts per billion, equals 1 mcg/kg, as there are 1 billion micrograms in a kilogram.) (Those extremely low levels came from areas, which are now state parks, covered in rivers. And if you look at a terrain map,

you'll see they're also covered in valleys carved out by the dendritic drainage systems a long time ago. And those old rivers carried the iodine out of the soil. But I imagine most modern farms wouldn't bother growing potatoes in a place like that.) So if you get potatoes from western Minnesota back in the 1930s, about 3 cups will give you more than 120 mcg. (Cups are a measure of volume. And grams are a measure of mass. But a cup of potatoes is about 200 grams). When you consider 2 heaping cups of leafy greens will give you 10 mcg and 2 cups of solid vegetables (like carrots) will give you 20 mcg, then you get to 150 mcg.[195] But if you're eating potatoes from Pennsylvania back in the 1930s, you would have to get about 8 cups to get to a little less than 120 mcg. Sounds like a tall order, but when you consider the guy on the all potato diet was eating 20 potatoes a day (1 medium-sized potato is roughly 1 cup), it probably isn't that hard. So, back in the 1930s, the people who got goiters were either in very poor soil or they weren't eating enough. (If you're wondering why those levels in the potatoes from those first three studies were so low, it had to do with the fact they were by the sea where rainwater can carry soil iodine out to the ocean, like Norway or the Chinese Fujian province, or it probably had to do with the Chernobyl accident of 1986. The third study was from Belarus and the Chernobyl accident was on the border of Ukraine and Belarus. It threw radioactive iodine all over their soil that was already the richest in the country for iodine.[196] So they were forced to move their crops to the northern less iodine-rich soil. And those who didn't had a higher rate of thyroid cancer. Even then, the average iodine levels are pretty low in that country from the start as there is no volcanic activity there.)

But we live in modern times and you probably live in America if you're reading this. Your produce most likely came from the California Central Valley or the fertile middle section of the United States. If not, there is a very good chance that your potatoes will be biofortified with iodine. And beans have about 18 mcg/100g and rice 14 mcg/100g so if you want to eat them instead you're also fine.[197] Sweet potatoes contain about 12 mcg/100g.[198] (If you look at this study, you'll notice, when grown in the right soil, potatoes and beans can contain very high levels naturally, 62 mcg/100g and 53 mcg/100g, respectively. And this is

typically the levels you see when you biofortified them.[199] And if you look at *that* study and wonder why their foods are already high in iodine *before* biofortification, it's because Nigeria has many recently extinct volcanoes in the area. See, science can explain everything. And the science is clear on what kind of diet you should have and how much sodium you should eat.) You're not going to be iodine deficient if you eat plenty of whole foods in a developed country. Even if you drink plenty of water in a day, you'll get about 10 mcg from that alone.[200] (Remember, water pulls out minerals, like iodine, from the soil. This is why you want a *hard* water, not a soft water, system at home. Unfortunately, activated carbon filters are very good at removing it from your water. This probably has to do with treatment plants turning iodide (ionic, single atom version of iodine) into a compound (usually, two iodine atoms joined together) making it larger and harder to pass through the activated charcoal filter.) And don't forget, strawberries can have a lot of iodine in them. So I think the best strategy is to eat a *variety* of fruits and vegetables, and have the occasional seaweed (they do make vegan sushi rolls, again, just be careful with the high in sodium soy sauce) or iodized table salt (a fourth of a teaspoon of iodized salt will give you about 60 mcg of iodine) and you'll be just fine. The only exception would be if you are running marathons or sweating for hours in the gym or if you're pregnant or breastfeeding, then, yes, you'll probably need to take some extra steps to make sure you are getting enough iodine.

Protecting Your Thyroid

Finally, keep in mind your thyroid and body needs the mineral selenium to protect itself from the oxidative effects of iodine. While iodine is naturally a pro-oxidant, selenium is naturally an antioxidant. Without selenium, your thyroid produces hydrogen peroxide which starts to damage your thyroid.[201] It may also protect you from over and under thyroid stimulation.[202] Like iodine, your thyroid also needs selenium to produce key hormones. Where do you get selenium? Whole foods. Brazilian nuts, sunflower seeds, tofu, black beans, chia seeds, whole wheat pasta, mushrooms, brown rice, and oats just to name a

few.[203] Even seaweed has trace amounts in it.[204] And this might partly explain why we tend to see an increase in thyroid cancer and thyroid dysfunction more so for supplements than whole foods. So eat your whole foods, but eat a *variety* of whole foods.

While iodine might seem confusing, just try to use whole foods to get your nutrition, including those from the sea. And, remember, thyroid dysfunction and cancer have a stronger link to meat, saturated fat, and obesity than anything else. Plants appear to be protective for both thyroid dysfunction and thyroid cancer. It appears best to get your iodine through whole foods and not through supplements or salt. If you're pregnant, breastfeeding, or have a toddler, have your doctor check your iodine levels and your toddler's iodine levels to be safe. And if you are going to use table salt, I would still use an iodized one as you should only be using a *little* bit of it anyway (and thus only a little bit of oxidative stress) and it'll help make sure you get enough iodine. Plus, the plants you should be eating anyway with their various antioxidants will still protect you from the pro-oxidant effects of iodine. So eat your fruits and vegetables.

Conclusion

So what should you do about salt? Like animal products, at the very least you should reduce your intake.

Remember, the American Heart Association recommends *no more* than 1,500 mg of sodium a day. And studies show that less than 1 gram (1,000 mg) a day will give the best results. There is no recommended minimum. Unless you sweat a lot or have kidney disease, you shouldn't worry about getting enough sodium, you should worry about getting too much. Again, athletes and people who sweat a lot should just restore their sodium and iodine levels during or after a workout so they don't have to adjust the amounts in their meals. But everyone else should stay away from sports drinks. And if you're in a developed country, you're probably getting *way* too much instead of not enough. Yes, you need *some* sodium, but that can be found in whole foods. Most vegetables will have about 20 mg a cup (most fruits have

pretty much none). And, remember, a fourth of a teaspoon of salt a day is about 500 mg of sodium and half a teaspoon is 1,000 mg of sodium. Don't forget that many condiments like salsa, hot sauce, or ketchup can have a high amount (about 100 mg a tablespoon). And also don't forget, a lot of meat is injected with a salt brine. Processed foods, salted meats, and foods prepared in restaurants (they tend to use kosher or sea salt, not iodized salt) are why most Americans get in the unhealthy range of 3,000 to 6,000 mg a day. And if you eat that stuff often, you'll end up with hypertension just like them.

But, remember, the studies show it's progressive, so even if all you do is reduce the salt in your diet you should see benefits regardless.

And reducing sodium in your diet means you'll have to take time to read the nutrition labels of processed foods if you eat them (even vegan ones can be loaded with sodium and saturated fat). You don't need to add up the milligrams, but you do need to be aware of what you’re putting in your mouth. And the best thing you can do is to stop eating processed foods (don't be eating those salty chips), prepare your own foods, and keep eating plenty of fruits and vegetables.

Guides

Always consult your doctor before you change what you eat.

Here is an easy food guide, shopping guide, to-do list, and supplement guide to use for your first week. I'm sure you'll figure out everything else from there.

Food Guide

Just remember to eat your oats, greens, and beans every day. Feel free to add other plant foods to boost their nutritional value but avoid adding salt.

Breakfast

- ❑ Oatmeal with berries and flaxseeds

Lunch

- ❑ Mixed greens with nuts

Dinner

- ❑ Beans and rice or potatoes

Snacks

- ❑ Mixed frozen vegetables
- ❑ Air-popped popcorn
- ❑ Various fruits

Drinks

- ❑ Tap water (add some lemon juice and drink through a straw)
- ❑ Coffee (avoid if pregnant, breastfeeding, or a child, no more than 4 cups a day)
- ❑ Soymilk or other plant milks
- ❑ Green tea, peppermint tea, and hibiscus tea
- ❑ Hot chocolate (no sugar)

Shopping Guide

Breakfast

- ❑ Oatmeal
- ❑ Mixed frozen berries
- ❑ Flaxseed

Lunch

- ❑ Mixed leafy greens
- ❑ Organic carrots
- ❑ Celery
- ❑ Beets
- ❑ Walnuts
- ❑ Almonds
- ❑ Sunflower seeds (no salt)
- ❑ Cranberries
- ❑ Raisins

Dinner

- ❑ Brown rice, dry
- ❑ Brown rice, microwavable
- ❑ Beans, dry (various)
- ❑ Beans, canned (various, low-sodium)
- ❑ Condiments - like salsa, hot sauce, ketchup, pepper, herb mix (low/no-sodium)
- ❑ Potatoes
- ❑ Sweet Potatoes

Snacks and Misc.

- ❑ Lemons and straws
- ❑ Popcorn for air popping
- ❑ Frozen vegetables (various)

❑ Fresh fruit

❑ B12 supplement

❑ Vitamin D

❑ Coffee grounds

❑ Paper coffee filters

❑ Iodized salt

To-Do List

❑ Take B12 (and possibly vitamin D) daily

❑ Squeeze lemon wedges into drinking water

❑ Sign up for and use Cron-o-Meter for a week

❑ Get your cholesterol levels tested

❑ Look up tasty vegan recipes online

❑ No cooking oils or dressings

❑ Donate blood twice a year

❑ Take frequent walking breaks during work

❑ Stay under 1,000 mg of sodium (unless you sweat a lot)

❑ Be more active and have more fun on the weekends (get more fresh air and sunshine with your friends)

Supplement Guide

❑ Pregnant and breastfeeding women - Prenatal vitamin (read the label for 150 mcg of iodine) or one serving (10 grams) of roasted seaweed (nori)

❑ Athletes in the hot sun – DIY sports drink (only drink *after* sweating):

- ¼ teaspoon of iodized salt
- ¾ teaspoon of kosher or sea salt
- 8 sugar cubes (8 teaspoons)
- 32 ounces (4 cups) of water
- Splash or up to ½ cup of coconut water
- Squeezed lemons and limes or hibiscus petals

❑ People who work out but don't sweat a lot – no need for a salty sports drink. Just eat a variety of fruits and vegetables.

❑ B12

❑ Vitamin D

❑ *Optional* - Vegan protein shake

❑ *Optional* - Algae-based omega-3

Further Reading

Guess what? There are even more reasons to avoid animal products!

Nutritionfacts.org - If you enjoy finding out interesting health facts, this should be your number one site. Dr. Greger does an awesome job of researching the newest studies and linking it all together.

DrEsselstyn.com - All these years and Dr. Esselstyn is still at it. See what he has been up to on his website. You might be able to catch him at one of his speaking events.

VeganHealth.org - Looking for more information on eating a proper vegan diet? This site is a great resource. The site is maintained by Jack Norris RD.

PlantPositive.com - If you really want to see some deep analysis of studies, check out Plant Positive. The author of this site has decided to stay anonymous.

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Finally, thank you for reading this book. Please consider giving it or copies of it to the people you care about. It might just save their lives.

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